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B

A

DESCRIPTION OF THE GENUS

PINUS,

WITH

DIRECTIONS RELATIVE TO THE CULTIVATION,

AND

REMARKS ON THE USES OF THE SEVERAL SPECIES:

ALSO

DESCRIPTIONS OF MANY OTHER NEW SPECIES

OF THE

FAMILY OF CONIFERÆ.

Illustrated with Figures.

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TAB. 44.

40. PINUS WEBBIANA.

PURPLE-CONED FIR.

PINUS WEBBIANA, foliis linearibus solitariis planis secundis patentibus apice emarginatis subtùs niveis, antherarum cristâ bicorni, strobilis erectis cylindraceis crassis nudis.

Pinus Webbiana. *Wallich in litt.*
P. spectabilis. *Lamb. Monog. v. 2. p. 3. t. 2.*

Habitat in Alpe Gosaingsthan Nepalensium dictâ, atque in aliis regionibus jugi Emodi seu Himalayæ. *W. S. Webb.*

DESCRIPTIO.

Arbor magna, formosa, pyramidata, 80-90-pedalis: diametro trunci juxta basin 3-4-pedali. *Rami* numerosi, horizontalitèr patentes iterum et iterum divisi, densè foliosi, in verticillis ad nodos dispositi, cortice pallidè cinereo rugoso scrobiculato tecti: *apicibus* assurgenti-incurvis. *Lignum* compactum, albo-roseum. *Folia* linearia, solitaria, conferta, secunda, patentia, coriacea, glaberrima, lucida, sesqui v. bipollicem longa, 2 lineas lata, suprà intensè lætèque viridia, lineâ depressâ medio canaliculata, margine subdeflexa, integerrima, sùbtus nivea, apice emarginata. *Amenta* lateralia, sessilia, basi squamis numerosis brevibus adpressè imbricatis (masculis) rotundatis membranaceis (fœmineis) latè ovatis cincta; *mascula* numerosa, cylindrica, gracilia, simplicia, è latere inferiore ramulorum extremorum enata: *stamina* monadelphia: *antheris* brevibus, obcuneatis, brevè pedicellatis, retrorsùm imbricatis, apice cristâ convexâ subreniformi supernè conicâ bicorni umbratis: *corniculis* brevissimis, obtusis, divaricatis; *fœminea* solitaria, oblonga, cylindracea, erecta, uncialia, atropurpurea: *squamis* brevibus, cuneato-rotundatis, margine membranaceis, repando-denticulatis, apice recurvatis, mucronatis. *Strobili* solitarii, erecti, obtusi, cylindracei, 4 v. 6 pollices longi, diametro sesqui v. biunciales, ad latus superius ramulorum extremorum adnati, colore intensè purpureo, turgidi resinâ, cujus globulis numerosis crystallinis pendulis irrorati; expressione tinctûs materiem colore purpureo usurpandam largientes: *squamis* brevibus, latissimè cuneatis, apice valdè dilatatis, coriaceis, circumscriptione rotundatis, integerrimis, inflexis, densè imbricatis, basi infrà squamulâ (bracteâ) brevissimâ muticâ persistente auctis. *Semina* ovali-oblonga, angulata, testâ crustaceo-coriaceâ crassâ obvoluta, gustu acri et odore intenso resinæ gaudent: *ala* tenuis, membranacea, lata, integerrima, obovato-dolabriformis.

This is undoubtedly the finest of the Fir tribe. I am indebted to the kindness of my friend Dr. Wallich for excellent specimens of it. It was discovered by Captain W. S. Webb, a distinguished traveller, and a zealous investigator of natural history, deservedly known for his admirable survey of the Himalaya Alps. I have, at various times, received seeds of it from Dr. Wallich, but they had unfortunately lost their vegetative power.

In the larger work I had named this *spectabilis*, but I am glad in having the opportunity of restoring the specific name of *Webbiana*, a tribute so justly due to the indefatigable zeal and botanical merits of its discoverer.

It is very much to be regretted that no plants of this splendid fir have been raised in this country, as it would prove a most valuable acquisition to our lawns, and likewise a tree of great utility, from its fine timber, which even equals in the texture of its grain and in odour the Bermudas cedar (*Juniperus Bermudiana*, Linn.).

I have received a very fine specimen of the timber from Dr. Wallich. The seeds of this species possess a greater portion of resin, and a stronger turpentine smell, than any other with which I am acquainted.

I shall subjoin the following interesting extracts, respecting this Fir, from letters received from Captain Webb, during his residence in Nepal, and by Dr. Wallich, transmitted to me. "This purple-coned Pine is called *Oumur*. It attains a height of 80 or 90 feet, with a diameter of the stem near the ground of 3 to 4 feet. The cone, about 3½ inches long, and 1½ inch in diameter, is produced on the extremity of the shoots. The leaves are about one inch long, of a beautiful bright green, having a white stripe along the centre. The wood is used for planes. The fruit, in an incipient state, is attached to the specimens, and is said to yield at full growth an Indigo or purple pigment by expression. The silvery hue of its bark, the beautiful contrast of the leaves with the rich purple of the cone, glittering with globules of transparent resin, produce in combination one of the most striking objects which can well be imagined; it is entitled to precedence for ornamental purposes, and would, I doubt not, be thought a desirable acquisition in England."*

EXPLANATION OF TAB. 44.

a, b. Branch with ripe Cones.
c. Female Catkin, magnified.
d. Scale of the Female Catkin, magnified.
e, f. Anther, magnified.
g. Portion of a ripe Cone shewing the rachis, to which the scales are attached.
h. Scale of the Cones, shewing the seeds.

* This tree is now introduced into this country, many young plants having been raised from seeds in the nurseries of Whitley, Brames, and Milne, at Fulham, and in other collections.



Pinus canadensis.

TAB. 45.

41. PINUS CANADENSIS.

CANADA PINE.

PINUS CANADENSIS, foliis solitariis planis denticulatis subdistichis, strobilis ovatis terminalibus, bracteolis truncatis subtrilobis ciliatis.

P. Canadensis. *Lin. Sp. Pl.* 1421. *Soland. MSS. Ait. Kew. v.* 3. 370. *Du Roi. Harbk. ed. Pott.* 2. 151.
P. Abies Americana. *Marsh. Arb. Amer.* 103.

Habitat in Canada.
Floret Maio.

DESCRIPTIO.

Arbor vasta, patula, facie *Taxi baccatæ. Folia* linearia, plana, tenuia, brevia, obsoletè denticulata, subtùs glaucescentia, subdisticha. *Amenta mascula* axillaria, pauciflora, brevissima, et ferè capitata, at longiùs pedunculata; antherarum crista reniformis, apice mucronulata: *fœminea* terminalia, solitaria, ovata, acuta, bracteolis obsoletis. *Strobili* haud unciales, ovati, acuti, læves, squamis paucioribus, rotundatis integerrimis.

P. Canadensis bears a great resemblance to the common Yew, but it is less stiff in its habit, and therefore much handsomer. The *trunk* acquires large dimensions in its native country, but this species has not been cultivated long enough to arrive at any great size in England. The *cones* are oval, pointed, and about the size of a common hazel nut.

This species is not so often met with as might be expected, but I have frequently seen it in the plantations of the curious. It is to be lamented that so elegant a tree is not more frequent in pleasure grounds, especially as it will succeed so well in this country. *P. Canadensis* was first cultivated amongst us by the late Mr. Peter Collinson, at Mill Hill, where a large tree is still remaining of his planting.

The specimen figured in the plate was procured from the Royal Gardens at Kew.

EXPLANATION OF TAB. 45.

a. Male Catkin.
b. Antheræ, magnified.
c. Ripe Cone.
d. Scales of the same.
e. Seed.

TAB. 46.

42. PINUS DUMOSA.

ALPINE FIR.

Pinus Dumosa, foliis solitariis linearibus obtusis secundis subtùs glaucis apice denticulatis, strobilis ovatis terminalibus solitariis, bracteolis cuneatis plicatis emarginatis glabris.

Habitat in Gosaingsthan Nepalensium *(Wallich)*, in Bhotaniæ alpibus. *W. S. Webb.*

DESCRIPTIO.

Arbor procera, facie *P. Canadensis*, densa. *Rami* numerosi, patuli, virgati, cortice cinereo-fusco obducti. *Folia* solitaria, linearia, obtusa, secunda, subpectinata, magis conferta quàm in *P. Canadensi*, 5 lineas aut pollicem longa, lineam lata, suprà viridia, nitida, subtùs glauca, margine deflexa, versus apicem obsoletè denticulata. *Strobili* terminales, solitarii, ovati, mucronati, læves, sessiles, pollicares: *squamis* latè rotundatis, ferè membranaceis, cinereo-fuscis, margine crispulatis et erosis. *Bracteolæ* brevissimæ, submembranaceæ, cuneato-rotundatæ, leviter plicatæ, ferè flabelliformes, emarginatæ, margine inæquales, glabri. *Semina* parva, cuneata, ferruginea, alâ oblongâ obtusâ pallidâ nitidâ scarioso-membranaceâ instructa.

Obs. Pino Canadensi omninò similis; at differt foliis magis confertis longioribus margine deflexis, strobilis majoribus cum squamis omnibus manifestè erosis, bracteolis cuneatis plicatis glabris.

This species is very nearly allied to the Hemlock Spruce, *(P. Canadensis)*, differing, however, from it in having longer and more crowded leaves, with their margin deflected: the cones are larger, with the scales wavy and somewhat torn at the edges, and the bracteæ cuneate, plaited and naked, not fringed at the margin.

It is found both in Nepal and Bhotan. Dr. Wallich's collectors have gathered it on Gosaingsthan, one of the lofty peaks of the Himalaya.



Pinus dumosa.

It is said to be found only at great elevations. In Nepal, it is called *Silloo-hatarhee,* and in Bhotan *Tongshing.*

The following extract respecting this Fir is from Captain Webb's letters: "This Pine was found in the southern confines of Bhotan, where it is called *Tongshing.* It delights in elevated positions, throwing out branches at fifteen or twenty feet. The leaves are extremely deciduous, a trifling shake being sufficient to detach them. The wood is not used, being likely to warp."

EXPLANATION OF TAB. 46.

a. Leaf, magnified.
b. Cone.
c. Scale of a Cone.
d. Bractea.
e. Seed.

TAB. 47.

43. PINUS TAXIFOLIA.

NOOTKA FIR.

Pinus Taxifolia, foliis solitariis planis integerrimis, strobilis oblongis, antheris inflato-didymis.

Habitat ad Americæ borealis oras occidentales.

DESCRIPTIO.

Habitus P. Canadensis, at *folia* angustiora et paululùm longiora, integerrima. *Amenta mascula* ovata, subsessilia multiflora; antheris inflato-didymis, cristà reflexâ, minimâ.

The figure was taken from a specimen in the Banksian herbarium, brought home by Mr. Menzies, by whom it was discovered on the north-west coast of America, and who has favoured me with the following particulars respecting this species.

In general habit this tree resembles *P. Canadensis*, and attains considerable height and size. The *leaves* are also very like those of the species just mentioned, but narrower, and their edges are entire, whereas the others are visibly serrated. The *inflorescentia* is much larger than in *P. Canadensis*, and there are more antheræ. As for the *Cones*, I can give no account of them, those which were brought by Mr. Menzies having been unfortunately mislaid. That gentleman, however, informs me, that they differ in their form from the cones of *P. Canadensis*, and that they are longer.

EXPLANATION OF TAB. 47.

a. Male Catkin.
b. Bractea, magnified.
c. Anthera, ditto.
d. Leaves.



Pinus taxifolia.



Pinus Larix.

*** Foliis numerosis fasciculatis, ex unâ basi vaginali.*

TAB. 48.

44. PINUS LARIX.

LARCH.

PINUS LARIX, foliis fasciculatis deciduis, strobilis ovato-oblongis, squamarum marginibus reflexis laceris, bracteolis panduriformibus.

P. *Larix*, foliis fasciculatis mollibus obtusiusculis, bracteis extra squamas strobilorum exstantibus. *Soland. MSS. Ait. Kew. v.* 3. 369. *Willden. Berl. Baumz.* 216.
P. *Larix*, foliis fasciculatis obtusis. *Linn. Sp. Pl.* 1420. *Syst. ed. Reich. v.* 4. 175. *Mat. Med. n.* 472. *Scop. Carn. n.* 1198. *Evel. Sylv. ed. Hunter.* 267. *Trew in Nov. Act. A. N. C. app.* 3. *t.* 13. *f.* 8. 28. *Pall. Fl. Ross. v.* 1. 1. *t.* 1. *It. v.* 1. 451, *et* 2. 127. *Mattusch. Fl. Sib.* 703. *Ludw. ect. t.* 86. *Blackw. t.* 477. *Dorr. Nass.* 263. *Allion. Fl. Ped. v.* 2. 178. *Woodv. Med. Bot.* 576. *t.* 210. *Vitm. Sp. Pl. v.* 5. 345. *Villars. Dauph. v.* 3. 807.
P. foliis fasciculatis deciduis. *Hall. Helv. n.* 1658.
P. foliis fasciculatis deciduis, conis ovato-oblongis; squamis ovatis subscabris margine laceris. *Du Roi. Harbk. ed. Pott. v.* 2. 85. *Reitter und. Abel. Abbild. t.* 96.
Abies foliis fasciculatis obtusis. *Linn. Hort. Cliff.* 450. *Gmel. Sib. v.* 1. 176.
Larix *decidua*, foliis deciduis, conis ovato-obtusis. *Mill. Dict. n.* 1.
L. folio deciduo, conifera. *Bauh. Hist. v.* 1. *p.* 2. 265. *Hort. Angl.* 43. *t.* 11. *Duhamel. Arb. v.* 1. 332. *n.* 1. *t.* 1. *Tournef. Inst.* 586.
Larix. *Bauh. Pin.* 493. *Dod. Pempt.* 868. *Cam. Epit.* 45, 46.
Der Lerchenbaum. *Linn. Pfl. Syst. v.* 2. 359.

Habitat in alpibus Helveticis, Vallesiacis, Stiriacis, Carinthiacis, Tridentinis, Sibiricis, &c.
Fl. Martio et Aprili.

DESCRIPTIO.

Arbor excelsa, recta, ramis patenti-deflexis, apice pendulis. *Folia* fasciculata, numerosa, undique patula, linearia, obtusiuscula, integerrima, glaberrima, mollia, lætè viridia, decidua. *Vaginæ* breves, crassæ, corrugatæ. *Amenta* lateralia, cylindracea: *mascula* cernua, multiflora;

antherarum apice inflato, didymo, cristâ reflexâ, cordatâ, acutâ: *fœminea* erecta, duplò majora, bracteolis exsertis, reflexis, imbricatis, panduriformibus, purpureis, mucronatis, mucrone nervoque viridi. *Strobili* adscendentes, unciâ paulò longiores, ovato-oblongi, fusci, nitidiusculi, squamis rotundatis, striatis, margine aliquantulùm reflexis, emarginatis, et demùm laceris.

P. Larix is of quick growth, and will rise to the height of fifty feet or more. The *branches* are slender, and their extremities generally hang downwards. They are adorned with long, narrow, soft *leaves*, which spring in tufts from a point, and spread open like the hairs of a painter's brush. Their colour is a light green, and they are deciduous. The *cones* are about one inch in length, obtuse at the *apex*, where they generally assume a purplish colour, and have imbricated *scales*, smooth on their surfaces, but of a lacerated appearance on the edges. Larches are now become extremely common in our nurseries, and it has been remarked that those which have been planted in the worst soils and most exposed situations have thriven best, circumstances which are peculiarly favourable to the increase of their number in this country. They should always be planted in clumps, and at the time of their removal from the nursery, if they be intended for a luxuriancy of growth, should not be more than three or four years old. I am informed that great quantities are now planted in Scotland, where this species is preferred to *P. sylvestris*, on account both of the goodness of the timber, and the quickness of its growth.*

The wood of *P. Larix* is used in Switzerland for covering the roofs of houses, being cut into shingles of about one foot square, and half an inch in thickness, which are nailed to the rafters. At first the roofs appear white, but in the course of two or three years become perfectly black, and the joints are stopped by the resin which the sun extracts from the pores of the wood, and which renders the roof impenetrable to rain. The tree is sufficiently frequent in that country to render the covering a cheap one. In Siberia the timber seems to have been used very generally for subterraneous, and even subaquatic purposes, such as the support of vaults, and the repair of canals. Pallas states that some burying places of an unknown nation, and of remote antiquity, still remain with beams and supporters of Larch entire.

By observation made on the strength of timber, it appears, that a beam of Larch, clear and free from knots, and every other imperfection, especially at or near the middle, eleven inches square, and six feet and a half long, can bear, if placed horizontally on its two extremities, a weight of two hun-

* A pamphlet has lately been published, entitled, "A Treatise on the Cultivation of the Larch, and Scotch Fir Timber," &c. by Mr. Pontey, 8vo. which places the advantages attending the culture of this tree in a strong point of view, and which I recommend to the perusal of those who wish for further information on this subject.

dred thousand pounds, suspended to the middle of it; and that it can bear a still greater weight in an oblique position.

It is from *P. Larix* that the true Venetian turpentine is extracted. This substance has been procured in the greatest abundance near Lyons in France, and in the valley of St. Martin, near Lucerne in Switzerland. But what is very remarkable, the inner part of the wood of this tree yields a pure gum, scarcely inferior in its qualities to the Arabian gum. In the Russian empire this has been received into the shops, and sold under the name of Orenburgh gum, an appellation extremely improper, as Pallas justly observes, Orenburgh being very distant from the Ural forests, where the gum is collected. The largest and handsomest Larch I have ever seen is at Strathfieldsay, the seat of the Duke of Wellington. The trunk of this tree is six feet in circumference, at the height of four feet and a half from the ground, and in proportion quite to the top. Its branches rest on the ground, extending over a space forty feet in diameter. It was planted between forty and fifty years ago by Mr. Malcolm, nurseryman, of Kennington Common. A peculiar *Boletus* draws its nourishment from *P. Larix*, and hence has acquired the trivial name of *laricinus*.

Miller mentions three varieties of *P. Larix*. The first of which he says is a native of America, and must be our *P. pendula;* and the second, which is said to be brought from Siberia, is probably the variety growing at Sion House, alluded to in my description of *P. microcarpa*. It is difficult to determine what is meant by his third variety, called *Larix Chinensis*, all the trees being now dead.

Since the above was written, that part of Professor Martyn's new edition of Miller's Dictionary, in which the genus *Pinus* is described, has been published, and I find the learned Professor's collections on the subject of the Larch so full and valuable, that I beg leave to refer the reader to that work.

EXPLANATION OF TAB. 48.

a, a.	Male Catkin, magnified.
b, b, b.	Antheræ, ditto.
c, c.	Female Catkin, ditto.
d, d.	Scale of the same, ditto.
e, e.	Inner Scale or Bracteola, ditto.
f.	Unripe Cone.
g, g.	Scales of a Ripe Cone, with the Seeds.
h, h.	Leaf, magnified.

TAB. 49.

45. PINUS PENDULA.

BLACK LARCH.

PINUS PENDULA, foliis fasciculatis deciduis, strobilis oblongis: squamarum marginibus inflexis, bracteolis panduriformibus acumine attenuato.

P. *pendula*, foliis fasciculatis mollibus obtusiusculis, squamis strobilorum bracteas tegentibus. *Soland. MSS. Ait. Kew. v.* 3. 369. *Willden. Berl. Baumz.* 215.

P. *intermedia*, foliis fasciculatis deciduis, conis ovato-cylindricis laxis; squamis subrotundis retusis. *Du Roi. Harbk. ed. Pott. v.* 2. 115. *Wangenh. Beit.* 42. *t.* 16. *f.* 37.

P. Larix nigra. *Marsh. Arb. Am.* 103.

Habitat in Americâ septentrionali.
Floret Maio.

DESCRIPTIO.

Habitus præcedentis, ramulis magis elongatis et pendulis. *Folia* ferè prioris, sed breviùs vaginata. *Amenta mascula* multiflora, antheris minùs inflatis, et breviùs cristatis: *fœminea* cylindracea, obtusa, bracteolis ut in præcedente. *Strobili* vix unciales, fusci, nitidi, ovato-cylindracei, squamis paucioribus, margine inflexis, integris.

P. pendula, as we are informed by Wangenheim, shows itself only in the cold mountainous parts of N. America, from the forty-fifth degree of north latitude; in such tracks it grows to a tall strong tree. Its native soil is a rich clay mixed with sand. The *bark* is of an ash-grey colour, and the wood reddish. The *branches* are weak and drooping. The *leaf-buds* are almost black, and yield a fine turpentine. The *leaves*, when full grown, assume a dark green colour, and fall in the autumn. In the province of New York, under the forty-second degree of north latitude, the *flowers* appear towards the end of April. The *seed* ripens in September, and is readily shed by the cones, the smooth scales of which sit very loosely. The *cones* are about half an inch commonly in length, they are rounded at the base,



and of a yellowish brown colour. The *wood* of this tree is said to be good and durable.

The first tree planted in this country was that which grew at Mill Hill in the gardens of the late Mr. Collinson, and which was the finest and largest tree I have ever seen, bearing great quantities of cones with ripe seed, annually. It was from that tree I procured the specimen from which the figure in the plate was taken.

Professor Pott observes, that the trees he has seen growing in Germany are two feet ten inches in the circumference of the stem, and are fifty feet in height; they do not grow so fast as the White Larch, but they surpass the *P. microcarpa*, and they have besides the advantage of the latter in the very straight growth of their stem, in which they exceed even the White Larch. The wood is firm, and seems likely to be good and useful.

EXPLANATION OF TAB. 49.

a, a. Male Catkin, magnified.
b, b, b. Antheræ, do.
c, c. Female catkin, do.
d. Scale of the same, do.
e. Bracteola, do.
f, f. Ripe Cone.
g, g. Scales of the same with the permanent Bracteola.
h, h. Scales with the seeds.
i. Seed.
k. Leaves, magnified.

TAB. 50.

46. PINUS MICROCARPA.

RED LARCH.

Pinus Microcarpa, foliis fasciculatis deciduis, strobilis subrotundis paucifloris: squamis inflexis, bracteolis ellipticis obtusè acuminatis.

P. *laricina*, foliis fasciculatis deciduis, conis subglobosis; squamis laxis orbiculatis glabris. *Du Roi. Harbk. ed. Pott. v.* 2. 117.

Habitat in Americâ septentrionali. *Floret. Maio.*

DESCRIPTIO.

Præcedentibus similis, *ramulis* laxè pendentibus, *foliis* paululùm minoribus. *Amenta mascula* brevissima et ferè capitata, antheris apice lateribusque ventricosis, cristâ muticâ, deflexâ: *fœminea* retusa, pauciflora, bracteolis obovato-ellipticis, acumine obtusiori. *Strobili* parvi, semiunciales, rubicundi, squamis paucioribus, margine inflexis, integris.

This species is very scarce in England, but would be a great ornament to the finest plantations. The only tree of any size I have seen is at Whitton, where it was planted by John Duke of Argyll, and which has a remarkably beautiful appearance in the summer, being covered with a great number of bright purple *cones*. The specimen from which the figure was taken came from that tree.

It is a very remarkable species, the cones being much smaller than those of *P. pendula*. Upon examining the two trees very accurately, I am inclined to suppose them really distinct: besides the smallness of the cones, they differ essentially in the figure of the *bracteolæ*.

The cones of both are sent from America annually to Mr. Loddiges, one under the name of the black, and the other of the red Larch. He has a large plantation of fine healthy trees of each sort about eight feet high, which produce many cones every year; and although they grow close to each other, the cones always remain distinct. There are two trees growing at Sion House under the name of the Siberian Larch, which I make no doubt were brought from America, and appear to be *P. microcarpa*.

EXPLANATION OF TAB. 50.

a. Male Catkin, magnified.
b. Anthera, ditto.
c, c. Female Catkins, ditto.
d. Bracteola, ditto.
e. Inner view of the same, ditto.
f. Scale of the ripe Cone, with the permanent Bracteola.
g. Scale with the Seeds.
h. Seeds.
i, i. Leaf, magnified.



Ferd.d Bauer delin.

— Pinus microcarpa

50



Pinus Cedrus.

TAB. 51.

47. PINUS CEDRUS.

CEDAR OF LEBANON.

PINUS CEDRUS, foliis fasciculatis perennantibus, strobilis ovatis obtusis erectis: squamis adpressis rotundatis.

P. *Cedrus*, foliis fasciculatis acutis. *Linn. Sp. Pl.* 1420. *Syst. ed. Reich. v.* 4. 174. *Evel. Sylv. ed. Hunter.* 311. *Ait. Kew. v.* 3. 369. *Vitm. S. Plant. v.* 5. 345. *Willden. Berl. Baumz.* 214.

P. foliis fasciculatis perennantibus, conis ovatis obtusis erectis; squamis adpressis rotundis, cortice lævi. *Du Roi. Harbk. ed. Pott. v.* 2. 120.

Larix Cedrus. *Mill. Dict. n.* 3.

L. orientalis, fructu rotundiore obtuso. *Tourn. Inst.* 586. *Duhamel. Arb. v.* 1. 332. *n.* 2. *t.* 132.

Cedrus, foliis rigidis acuminatis non deciduis, conis subrotundis selectis. *Trew. Ehr. t.* 1, 4. 28, 60, 61. *Nov. Act. A. N. C. v.* 3. *App.* 445. *t.* 13. *f.* 1. 7. 11. 12. 14.

C. conifera, foliis laricis. *Bauh. Pin.* 490. *Raii. Hist.* 1404.

C. Libani. *Barr. Ic.* 499. *Edw. Ornith. t.* 188.

C. Phœnicia. *Renealm. Sp.* 27.

Cedrus. *Bell. It.* 162. *Cam. Epit.* 57.

Die Wahre Ceder. *Linn. Pfl. Syst. v.* 2. 356.

Habitat in Syriæ, Libani, Amanæ, Tauri montibus.
Floret Octobri.

THIS is too remarkable a tree to be mistaken or confounded with other species. Its *branches* are very long, and disposed like those of *P. Larix*. After the excision of a branch, the part remaining in the trunk gradually loosens itself, and assumes a round form resembling a potatoe; if the bark covering it be struck smartly with a hammer, the knot leaps out. This fact was communicated to me by Sir Joseph Banks, and I have since repeated the experiment myself. The *leaves* are small, stiff, and of a fragrant smell. The *cones* are very large, and have rounded, membranous *squamæ*, which in their natural state are pressed close, but unfold when exposed to warm water. There are six cotyledons.

From the observations made by Pallas in Siberia, dry ground is not so favourable as moist to the growth of *P. Cedrus*. This traveller asserts

plants for some time; and removed to their present situation in 1767. The largest of the two measured, in 1829, nine feet in circumference, having grown only an inch in the last two years, the chalk being unfavourable to its growth.

"The largest Cedar at Highclere, though much younger, measured in 1830, at three feet from the ground, ten feet one inch in circumference; it was reared from a cone, which came from the Wilton Cedars in 1772, and was about forty-eight years old before it bore.

"It was known to the late Earl of Carnarvon, that the Cedars at Wilton were kept by his grandmother, the Countess of Pembroke, in pots at her window, till growing too large, they were planted upon the lawn, between the house and the water, a situation very favourable to their growth. Supposing them to have been forty-eight years old, when the cone was gathered from them in 1772, they must have been raised as early as 1724. It is most probable, they were between 1710 and 1720; for the Countess of Pembroke who cultivated them, died before her husband, who married again after her death, and died in 1733.

"The oldest Cedars at Highclere are, therefore, now (in 1831,) ninety-two years old; those at Wilton, at least one hundred and six, probably between one hundred and ten and one hundred and twenty.

"Dr. Pococke found the circumference of the largest Cedar with a round or single stem to be twenty feet; but he does not state how near the ground he measured it."

Some of the most vigorous and beautiful in this country at present are growing at Pain's Hill, Whitton, and Chiswick. They produce a prodigious number of cones annually.

"The only relick of Dr. James Sherard's famous botanical garden at Eltham, so elegantly displayed by Dillenius, is a Cedar of Lebanon, which girts nine feet at three feet from the ground. It is now in the possession of John Dorrington, Esq."—*Lyson's Environs of London*, p. 403.

The specimens figured in the plate were taken from a fine tree in the Royal gardens at Kew.

EXPLANATION OF TAB. 51.

a. Branch with male Catkins.
b. Antheræ.
c,c. Ditto, magnified.
d. Scale of the female Catkin, showing the stigmata magnified.
e. Scale of the Cone.
f. Seed.



Pinus Deodara?

TAB. 52.

48. PINUS DEODARA.

INDIAN CEDAR.

PINUS DEODARA, foliis fasciculatis perennantibus acutis triquetris rigidis, strobilis geminis ovalibus obtusis erectis: squamis adpressis.

Pinus Deodar. *Roxb. Fl. Ind. ined.*

Habitat in Indiæ Orientalis montibus ad urbis Rohilcund Septentrionem *(Roxburgh)*, in Nepaliæ et Thibetiæ alpibus (Alt. 10—12000 ped.) *Herbert, Moorcroft*; in Almoræ sylvis. *Robertus Colquhoun, Baronettus, W. S. Webb.*

DESCRIPTIO.

Arbor maxima, lignum densum optimum terebintho passim maximè impregnatum præstans, trunco crassissimo ad usque 3—4 pedes diametro. *Rami* ampli, patentissimi, supernè foliosi, cortice albicante. *Ramuli* assurgentes, tuberculosi è basi foliorum persistente, cortice cinereo obducti. *Folia* in fasciculis (ramulis nondùm evolutis) numerosa, rigida, perennantia, triquetra, sesqui v. bipollicaria, acicularia, viridia, lucida, bicanaliculata, apice acuta, callosa; in arbore juveni, ut in *Abiete*, semper sparsa, rigida, pungentia. *Amenta mascula* ovali-oblonga, obtusa, subclavata. *Strobili* pedunculo tereti crasso dichotomo sæpiùs gemini, ovales, obtusissimi, erecti, quadri v. bipollicares, crassitie unciales aut biunciales et ultrà: *squamis* latissimis, transversè oblongis, lamelliformibus, ferrugineo-fuscis, adpressè imbricatis demùm reflexo-patulis, margine integerrimis atque planis, ferè membranaceis. *Semina* parva cuneata; *ala* obovata, membranacea, fusca.

THE *Pinus Deodara* is a tree of great size, and is rendered interesting by its near affinity to the Cedar of Lebanon. In the Hindustanee language it is called *Devadara*, or "God Tree," and is held in great veneration by the Hindoos. The cones grow generally in pairs on a shortish, thick, woody, forked footstalk. Those of the *Pinus Cedrus* are almost sessile and solitary. The leaves are also different from those of *P. Cedrus*, being longer, and more distinctly 3-sided.

I have received from Dr. Wallich a section of the trunk of the *P. Deodara*, measuring nearly four feet in diameter. The wood is very resinous,

and possesses a strong turpentine smell, very different from that of the Cedar of Lebanon: and indeed seems to be the most valuable of the genus, and of a fine close grain, capable of receiving a very high polish, and from its being so strongly impregnated with turpentine, rendered almost imperishable, and justly entitling the tree to the appellation of the "Indian Cedar," which has been bestowed on it. These remarks are given, from having had a portion of the section I received from my valued friend, Dr. Wallich, planed and polished, and they are corroborated by the following interesting extracts from Mr. Moorcroft's Journal, lately deposited in the Library of the India House, for which I am indebted to the kindness of my friend, Mr. Wilkins. Mr. Moorcroft, not aware of the specific difference existing between the Deodar and the Cedar of Lebanon, refers to the latter, as the same species, in the beginning of the following extracts.

NOTE BY MR. MOORCROFT.

"*On the wood of the variety of Cedar called Deodara.*"

"The great durability of the wood of the Cedar, and the belief of its exemption from the tooth of the worm, which preys upon other kinds of timber, have given rise to a notion of this wood being nearly incorruptible, if shielded from mechanical violence; but although exaggeration may have crept into the relations of the facts, from which this conclusion has been adopted, it is extraordinary that the prevailing opinion of the merits of this wood should not have introduced the Cedar, as a timber tree, in the forests of Europe, instead of being held as a mere exotic curiosity, confined to gardens or pleasure-grounds. In some portions of the Indo-Tartaric mountains, certain varieties of Cedar have been dignified by the appellation of Deodara, or Wood of the Gods. In others it has been wholly respected, or sparingly used for incense on occasions of ceremony, whilst in others, again, its wood is employed in buildings, or in various other purposes, and not unfrequently in the form of lathes, as candles. I had no opportunity of estimating the value of its claim to the qualities assigned to it, till my arrival in Kashmeer, where its application to buildings, both public and private, to bridges and to boats, furnished me with certain data, which I shall submit in detail.

"A few years ago a building erected by the order of the Emperor Akbar was taken down, and its timber of Deodar were found in a state so little impaired, as to render them fit to be employed in a house built for my friend, Rhaja Shah. Granting that the former edifice was constructed at the same time with the fort of Nagurnuger, A. H. 1006, or A. D. 1597, its age is 225 years.

"Zenool Abudeen began to reign over Kashmeer A. H. 820, or A. D.



Pinus Deodara.

1417, and died A. H. 878, or A. D. 1473. His mother was interred in a domed building of excellent brick and mortar work, reported to have been erected in the time of the Hindoo sovereigns. Its solid walls, from seven to eight feet thick, differ much in character from the facing and rubble work common in the reigns of the Mogul emperors of Hindostan. In this building pieces of Deodar were inserted in the walls, by way, apparently, of strengthening the bond; and their ends or sides were left on the same plan with the brick work. The window frames were of the same material, with the difference, however, of the former being squared and deprived of their sap wood, whilst the latter, somewhat carelessly, had part of the sap wood left, and the surface was only slightly smoothed, and partly retained its original form. In the latter instance, the crust of the wood was generally somewhat crumbly, and had been pierced by the worm about a quarter of an inch in depth, whilst that of the squared wood, exposed much more to the influence of the weather, was neither crumbly nor worm eaten, but was jagged, from the softer part of the wood, between the plates or ribs, having often been washed by the rain, though its structure had not been attacked by the worm."

EXPLANATION OF TAB. 52.

a, c. Portions of a branch, the one bearing male Catkins.
b, b. Anthers, surmounted by their crest.
d. Full-grown Cone.
e. Scale with the seed.
f, f. Seeds separate.

TAB. 53.

49. CUNNINGHAMIA SINENSIS.

BROAD-LEAVED CHINESE FIR.

CUNNINGHAMIA. (*Br. Rich.*) *Flores* monoici. *Antheræ* 3, pendulæ, distinctæ basibus solutis. *Strobilus* ovatus: *squamis* ovatis, acutis, coriaceis, imbricatis. *Semina* 3, compressa, alâ cincta. *Embryo* dicotyledoneus. *Folia sparsa, lanceolata, acuminata, plana.*

Cunninghamia Sinensis. *Rich. Conif. p.* 149. *t.* 18.
Belis jaculifolia. *Salisb. in Linn. Trans.* 8. *p.* 316.
Pinus lanceolata. *Lamb. Monog. t.* 34.
Abies major sinensis, pectinatis Taxi foliis subtùs cæsiis, conis grandioribus, sursùm rigentibus, foliorum et squamarum apiculis spinosis. *Pluk. Amalth.* 1. *t.* 351. *fig.* 1.

Habitat in China.

DESCRIPTIO.

Arbor mediocris, *Araucariæ* facie. *Rami* plerumque verticillati, horizontaliter patentes. *Folia* sessilia, undique patenti-deflexa, sesquiuncialia, lanceolata, acuminato-pungentia, rigida, plana, integerrima, margine scabriuscula. *Amenta mascula* terminalia fasciculata, cylindracea, vix pollicaria. *Strobili* magnitudine nucis *Juglandis*, sessiles, nutantes, globosi, læves: *squamis* ovatis, acuminatis, coriaceis margine argutè denticulatis.

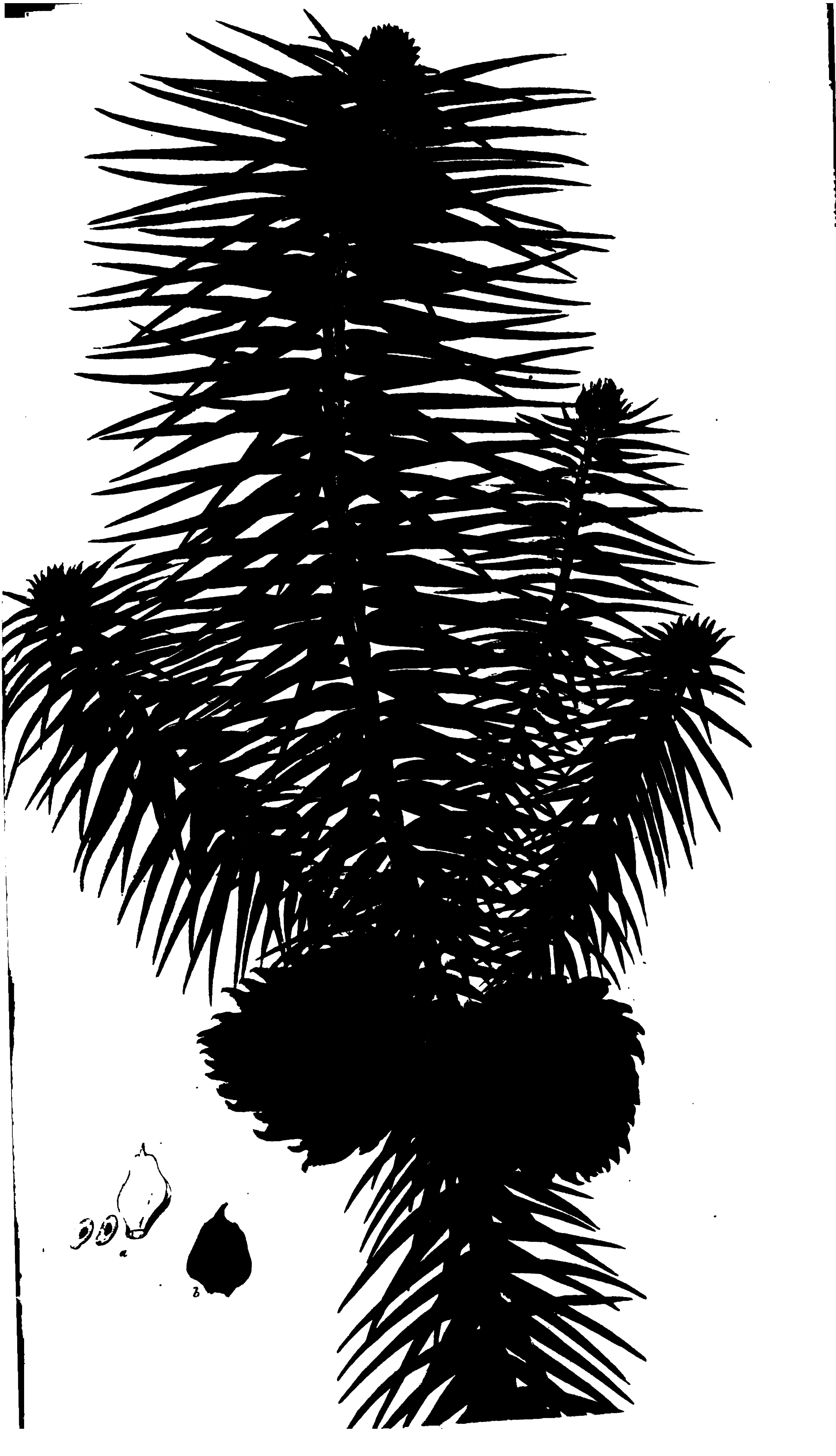
THE fine specimen from which the figure was taken, was brought to England by Sir George Leonard Staunton, Bart. and is now in the Banksian Herbarium. The province in which it was seen growing was Chekiang.

The tree is now common in collections, but it is not sufficiently hardy to endure our winters without protection. It is readily propagated by cuttings.

This very distinct genus was first separated from *Pinus* by Mr. Salisbury, in the eighth volume of the Transactions of the Linnean Society, under the name of *Belis*; but there being already a *Bellis* in the annals of Botany, I gladly avail myself of the name proposed by Mr. Brown, and adopted by M. Richard in his valuable and interesting work.

EXPLANATION OF TAB. 53.

a, a. Leaves.
b. Scale of the Cone.


a
b



Dammara Orientalis.

TAB. 54.

50. DAMMARA ORIENTALIS.

AMBOYNA PITCH TREE.

DAMMARA. *Rumph.*

AGATHIS. *Salisb.*

Flores monoici. Masc. *Amentum* cylindricum, valdè compactum, firmum. *Antheræ* in singulâ squamâ plurimæ (5—24) pendulæ, sub peltâ convexâ osseâ adnatæ, vix inter se coalitæ, circa latus inferius squamæ stipitis simplici v. duplici ordine dispositæ, uniloculares, rimâ longitudinali dehiscentes. Fœm. *Amentum* ovali-oblongum, compactum, teres, læve. *Strobilus* turbinatus: *squamis* crassis, coriaceis, cuneatis, extùs convexis. *Semina* ad singulam squamam bina, cuneata, alâ membranaceâ instructa: *testa* crassa, crustacea: *albumen* copiosum, carnosum. *Embryo* rectus, dicotyledoneus: *cotyl.* orbiculatæ, plano-convexæ, crassæ: *radicula* cotyledonibus triplò longior, recta, basi attenuata et obtusa.

Arbores (*Amboinæ. et Novæ-Zeland. Insular.*) *amplæ, frondosæ,* Podocarpi *facie, resinifluæ.* Folia *opposita v. sparsa, patula, elliptica v. oblonga, lata, plana, coriacea.* Flores *monoici, utriusque sexûs in amentis solitariis digesti.*

Dammara Orientalis, foliis oppositis ovali-oblongis nervosis basi attenuatis, strobilis turbinatis: squamis adpressis apice rotundatis.

Dammara alba. *Rumph. Amboin. v.* 2. 174. *t.* 57.

Agathis loranthifolia. *Salisb. in Linn. Trans.* 8. *p.* 312. *t.* 15.

A. Dammara. *Rich. Conif. p.* 83. *t.* 19.

Pinus Dammara. *Lamb. Monog. ed.* 1. *p.* 32. *t.* 38.

H

Arbor Javanensis Visci foliis latioribus conjugatis, Dammara alba dicta. D. Sherard. *Raii. Hist. v.* 3. *dendr.* 130. *Herb. Sherard.*

Habitat in Amboinæ excelsis montibus, solo argillaceo.

DESCRIPTIO.

Arbor, ex auctoritate Rumphii, abietiformis, excelsa, caudice simplici, tereti, glabro, comâ parvâ.

Ramuli foliosi, tetragoni, glabri. *Folia* opposita, decussata, breviùs petiolata, elliptico-lanceolata, obtusa, integerrima, coriacea, glaberrima, nitida, nervis plurimis parallelis obsoletè striata. *Strobilus* ovatus: *squamis* obtusis, muticis, suprà marginatis. *Semina* elliptica, compressa, sulcata, apice emarginata, hinc alata, alâ rotundato-cuneiformi.

For the specimens represented in the plate I am obliged to Sir Joseph Banks, who received them from Amboyna. They were sent home in spirits by Mr. Christopher Smith, Botanist to the East India Company, at Amboyna. Dr. Smith has also discovered a specimen of the leaves in the Sherardian herbarium at Oxford, among the plants collected by Dampier. From these materials, and the account given by Rumphius, all our knowledge of this tree is derived.

What he has accidentally (as he was ignorant of the sexes of plants) called the male and female trees, are really so; but that this species is dioecious, I should very much question, as the New Zealand one is certainly monoecious. His account of the valuable resin, for which it is most remarkable, is here subjoined.

The following is an account of the resinous substance produced by this tree, which is well known in India under the name of *Dammar-Puti, Dammar-Batu*, or *White Dammar*, and has been thus described by Rumphius, in his *Herbarium Amboinense*. (Lib. 3. cap. 10.)

"The pellucid resin which flows from this tree is at first soft and viscous, but within a few days it becomes as hard as stone, and has all the transparency and whiteness of crystal, especially that which adheres to the trees, and it will sometimes hang from them in the shape of icicles; that which flows to the ground, however, becomes black, and mixed with extraneous matter. These *icicles* (as they may be called) are sometimes as much as a

palm in breadth, and a foot in length, and exhibit an elegant, striated appearance. For the first half year, the resin retains its white colour and transparency, but afterwards assumes a beautiful amber colour. It is brittle, and when broken shines like glass. It is much harder than the sort known by the name of *Dammara Selanica*, and in some degree admits of being bent, but when pounded it is friable. The product of the male trees is more white and pellucid, but dries more slowly and exudes in a smaller quantity, whence little or none is collected from them. To force a supply of this substance, it is usual to make incisions in the lower part of the trunk with sharp knives. This occasions the formation of large knots in the wounded places, which protrude like heads, as in the maple, are covered with dammar, and put forth a number of branches.

"The peasants clear away the rubbish around the feet of the trees, and dig holes, in order to collect the dammar free from impurities; where the roots rise bare out of the ground, however, they are made knotty by incisions, and yield resin like other wounded parts of the tree, becoming covered with a sort of white bark.

"The smell of fresh and soft dammar is perfectly resinous, but when dry this substance does not emit any particular odour; thrown on burning coals, it gives out a smell partaking of turpentine and mastich, as does also the taste, though the latter is somewhat like the *Canarium*. It is very inflammable, and burns longer than the *Dammar Selan*, but without any crackling, though it emits a great quantity of acidulous smoke, which produces a very unpleasant effect on those who are unaccustomed to it.

"As the common dammar, sold in the market, is white and semi-transparent, as well as that collected from the knots of the lower part of the trunk, so is the latter changeable in its colour, varying from a reddish to a horny, and even to a black appearance; it is, nevertheless, hard and pellucid, like the great masses and heads which hang from the thicker branches and oldest trees, for, as these cannot on account of their height be ascended, the masses hang on them the longer, and lose their original whiteness and become of a horny colour. This circumstance is particularly remarkable on the dammar trees about *Way*, whence I am led to believe that the variations of colour proceed from the difference of the time of year, or from the interval that the masses remain in their native situations.

"In the year 1688, I sent a piece of dammar to the University of Leyden, which, in its form, resembled the head of an infant, and by artificial means had been made to assume something like features; but the nose was very ugly, and there were red marks near it, resembling streaks of blood. I have also in my own possesion a large white semitransparent mass, which resembles an immense ox's gall bladder. Some of the crystalline branches sent into Holland did not retain their colour, but became, there, of a sort of amber hue.

"The Malay name of *Dammar Puti*, and *Dammar Butu*, signifies *stone resin*, for it is the hardest of all the Dammars, and approaches very near to the *Gum Animæ*. Among the Ternaats it is called only *Sălo*, or *Salo Bobuda*; in Amboyna, *Camal Camar*, and *Cama*; about Lariqua, *Isse*; and about Grisecca, in Java, *Dama*.

"The medicinal uses of this resinous substance have not yet been discovered. Some of the people of Amboyna, however, (but I own I would not, myself, be of the number,) whose feet have been wounded with thorns, or splinters of wood, have no sooner extracted the latter than they have dropped into the punctured parts a drop or two of burning dammar, which has prevented the formation of an ulcer, and scarcely created any pain in the callous, hard soles of the Indians. This species of Dammar is not easily liquefied, except by means of an admixture of Calapp oil, or common pitch. It is not found, however, to adhere well to the keels of ships, but is apt to fall off, and therefore does not answer the purpose of pitching; yet it deserves further trial, especially in a country where the want of pitch is attended with so much danger to navigation: other resins, indeed, will in some measure supply its place. To persons who write much (as clerks and secretaries) the dammar is of some use, for if they have occasion to scrape out a letter or a word, and will afterwards sprinkle a little of the powder on the place from which the erasure has been made, the paper is rendered smooth and susceptible of being again written on; but the letters soon become faint.

"The *Dammar Radja* (called by the Ternaats *Salo Calano*) is the same resin as that above described, but only the largest and most transparent pieces, which hang from the upper part of the trunk, free from impurities. That which is found at Batsjana and Hallempaera never turns yellow like the Amboyna dammar, but is almost always white, and very gradually acquires any tinge of yellow; in taste and smell, however, it is the same, and collected from the same kind of tree. This sort alone is employed by the kings of the Moluccas as a suffumitory, whence it obtains the name of *royal dammar*, and the common people are prohibited from using it.

"There is some amusement in observing people unacquainted with this substance, who, meeting with it in the shops, take it to be lump sugar; as it is sold at a very cheap rate, the purchasers seek out the first corner to enjoy a taste of it, but immediately discover their mistake.

"In books of voyages, we sometimes read of large quantities of mastich being found in these islands, but the substance alluded to is no other than the *Dammar Batu*, which, when burnt, emits the same smell."

The plate is coloured from a plant growing in the Royal Gardens at Kew.

EXPLANATION OF TAB. 54.

a. Branch of the *Dammara Orientalis*, from Sir Joseph Banks's herbarium.

b, b. Scales of a ripe Cone.

c. Seed with its Wing.

d. Is supposed by Mr. Francis Bauer, who made the drawing, as well as by myself, to be a female Catkin, and that the oblong bodies at the base of the enlarged scales e, e, may be the real stigmas, which, if true, will throw a new light on the fructification of this genus. Dr. Smith is rather persuaded, from an attentive consideration of the description in Rumphius, that this is the Male Catkin, and that the bodies in question are *Antheræ*.*

f. Ripe Cone.

h. Transverse section of a Cone.

* These bodies are really anthers.



Dammara Australis.

When I published my former work on Pines, although I was well aware that the Dammar would prove a very different genus from *Pinus*; yet, as I had not then sufficient materials to enable me clearly to define its characteristic marks, I preferred uniting it to that genus. Great credit is due to Mr. Salisbury, who, in his valuable paper on the *Coniferæ*, inserted in the eighth volume of the "Transactions of the Linnæan Society," was the first to separate it, and has there, with great accuracy, determined its distinguishing characters.

The fine species, of which I have here given a figure, is a valuable addition to the genus, and will serve to illustrate and establish with greater precision those important marks, on which the genus is founded. I have retained the old name given to this genus by Rumphius, in preference to that proposed by Mr. Salisbury. I am not disposed to agree with that gentleman regarding the structure of the anthers, which he considers as being many-celled; instead of considering them as so many unilocular anthers very slightly cohering together.

This latter is the view which I am inclined to take respecting the structure of the anthers in *Dammara*, and I am further supported in this opinion by the same structure occurring in *Araucaria*, where the anthers are still more evidently separate from each other. In *Dammara* the cotyledons are two, and constantly undivided.

The *Dammara australis* may justly be ranked as one of the finest timber trees which New Zealand produces, often rising to the amazing height of one hundred and forty feet, with a diameter, near the base, of four or seven feet. Its trunk is straight and even-grained, rendering it very suitable for ship masts.

The tree yields, both by incision and spontaneously, vast quanties of a pure and limpid resin, which soon hardens on exposure to the air. An extensive cabinet-maker has tried this resin in varnishing, and declares that it is equal, if not superior, to the best copal varnish. This valuable resin is, perhaps, deserving of attention as an article of commerce.

For the branch, represented in the plate, I am indebted to the friendship of John Deas Thomson, Esq. Commissioner of the Navy. It was brought home by Capt. Downie, under whose order two ships were sent by government sometime ago, for the purpose of procuring timber fit for ship-building. Capt. Downie had the kindness to present me with a large mass of the Cowrie resin, contained in a box made of the timber, which in grain resembles the finest deal.*

* I am indebted to my friend John Barrow, Esq. Secretary to the Admiralty, for the following statement of a comparison, which he made between a piece of Cowrie and Riga Fir.

A piece of Cowrie 1½ inch square, 3 feet long, suspended 10 inches from the end, bore the weight of 1 cwt. 2 qrs. 15lbs. at the other end before it broke. The piece weighed 1 lb. 13 oz.

A piece of Riga Fir bore the weight of 1 cwt. 2 qrs. 1 lb. The piece weighed 1 lb. 8 oz.

The Horticultural Society were fortunate in obtaining a living plant of the *Dammara australis*, which is now several feet high. It was brought over at the same time with the timber.

Extracts from Capt. Cruise's Journal of a Ten Months' Residence in New Zealand.

"The immense spars requisite for making the top-masts of the larger classes of ships in the navy, had become so extravagant in price, and so scarce in Europe, that it was necessary to look for them elsewhere. Capt. Cook had mentioned in his voyage that he thought the timber he had seen in New Zealand, if light enough, would make the finest masts in the world: persons who subsequently visited the island had confirmed the opinion, and a small spar which was brought from thence to England by the Catherine, whale ship, was much approved of, and purchased for a fore-top-gallant mast for the Dromedary. It was well tried during its return to its native country, and proved itself to be, in seaman's phrase, a *stick* of first rate quality.

"It may be proper here to observe, that two kinds of trees are known in New Zealand, which, from the circumstances of their growing to an immense height without a branch, are considered fit for masts of large ships; the one is called Kaikaterre, the other *Cowry* or Cowdy. The Kaikaterre is found in low swampy ground, frequently on the banks of rivers, and is on that account easy to procure; it produces a leaf like the Yew, and a red berry.* The Cowry, to which the inhabitants of the island give a decided preference, grows on dry ground, and often on the tops of the highest hills; its leaf, though considerably larger, is not unlike that of our box tree; it produces a cone, and yields abundance of resin. Some of the Cowry trees which we measured rose one hundred feet from the ground, without a single branch, and afterwards headed almost as umbrageously as the lime; the stems of others not so tall, gave a circumference of forty feet.

"The Cowry was the timber which the Dromedary was directed, if possible, to bring home, and as it is requisite that every spar fit to make a top-mast for the larger ships of the navy should be from seventy-four to eighty-four feet long, from twenty-one to twenty-three inches in diameter, and perfectly straight, the success of the attempt, in a great measure, depended upon the proximity of the trees to the water's edge, and also in no small degree upon the friendly disposition of the natives."—p. 2, *et seqq.*

* The Dacrydrium Taxifolium is evidently here meant.

And again, p. 163.—" The ground is generally under cultivation, producing potatoes, degenerated turnips, and cabbages, while the surrounding hills, which, from their height and diversity of shape, form a splendid piece of scenery, are covered with wood; and the Cowry, whose loftiness and richness of foliage, distinguishes it from the other trees in the forest, grows in great abundance."

EXPLANATION OF TAB. 55.

a. Branch, with a Cone and male Catkin.
b. Male Catkin.
c. A transverse section of the same.
d, d. Anthers attached to the columella, and surmounted by the crest.
e. Anther separate.
f. Cone.
g, g. Scales of the Cone.
h, h. Seeds.

TAB. 56, 57.

52. ARAUCARIA IMBRICATA.

CHILI PINE.

ARAUCARIA. *Juss.*

DOMBEYA. *Lam.*

PINI SP. *Molin.*

Flores dioici. Masc. *Amentum* dipsaciforme, ovato-cylindricum. *Squamæ* numerosæ, sessiles, imbricatìm ad axim communem conicum compactæ, filamentorum æmulæ, obovatæ, sublignosæ, acumine oblongo reflexo. *Antheræ* numerosæ, oblongæ, biloculares, paulò infra acumen squamarum connatæ, posteà dependentes, liberæ, initio squamis adpressæ, tandèm, emisso polline, divaricatæ.

Fœm. *Amentum* ovatum, in quo squamæ numerosæ, cuneiformes, biflores. *Germen* cuneiforme, compressum duobus lateribus oppositis. *Stylus* nullus. *Stigma* bivalve, callosum, crassum: *valvularum* exterior ovato-acuminata, major, concava, acumine lineari inflexo; interior minor, sublinearis, obtusa, erecta. Pericarpium: *Strobilus* sphærico-ovatus, cujus squamæ conniventes, coriaceo-lignosæ, cuneiformes, acumine longo subulato terminatæ, dispermæ. Semen: *Nux* cuneiformis, apice terminata alâ brevi, callosâ, marginali, basi obtusè tetragona, dehînc gibba, supernè compressa, lateribus oppositis: *tegumento* coriaceo. *Nucleus* ejusdem figuræ. *Pavon Dissert. in Mem. Acad. Reg. Med. Matrit.* 1. *p.* 197.

"This genus belongs to the sixteenth class of the Linnæan system, called *Monadelphia*, and to the Natural Order *Coniferæ* of Jussieu and Linnæus.

"In the month of September, 1782, I left, for some time, my companion Don Hippolito Ruiz, and visited the mountains named Caramavida and Naguelbuta belonging to the Llanista, Peguen and Araucano Indians. I spared neither pains nor expense in fulfilling the object of my mission, and amongst many plants, which were the result of my two months excursion, I found in flower and fruit the tree which I was about to describe.

"The chain or Cordillera of the Andes offers to the view in general a





rocky soil, and in parts wet and boggy, on account of the abundance of rain and snow, which fall in these regions, similar to many provinces of Spain. There are to be seen large forests of this tree, which rises to the amazing height of 150 feet: its trunk is quite straight and without knots, ending in a pyramid formed of horizontal branches, which decrease in length gradually towards the top, and is covered with a double bark: the inner is five or six inches thick, fungous, tenacious, porous and light, from which, as almost from all other parts, flows resin in abundance: the outer is of nearly equal thickness, resembling cork cleft in various directions, and equally resinous with the inner.

"I have found only one species of this genus, which I call *imbricata* on account of its imbricated leaves, and which may be defined as follows:

"*A. imbricata*, foliis octonis imbricatis ovato-lanceolatis mucronatis perennantibus.

"Pinus Araucana. *Molina Sagg. sulla Storia Nat. del Chili*, p. 182.

"*Truncus* rectissimus, 150 pedes sæpè altus, comâ frondosissimâ conico-pyramidali terminatus: cujus cortex est fungosus, valdè rimosus, crassitie semipalmari. *Rami* verticillati, sex septemve in singulis verticillis, et sæpiùs octo in *inferioribus*, horizontales, extremitatibus inflexo-adscendentibus. *Ramuli* erecti. *Folia* imbricata, sessilia, subdecurrentia, versus basin incrassata, ovato-lanceolata, stricta, apice rigido-mucronata, verticillata, sena, septena octonaque, concava, rigida, glaberrima, nitida, coriacea, perennantia, margine cartilaginea, inferiùs subcarinata, notata lineis longitudinalibus utrinque punctatis. *Amenta masculina* in distinctâ arbore, et in apice ramulorum, quatuor, quinque, sexve aggregata, pedunculata, ovato-cylindrica, dipsaciformia, erecta, sublutea: *squamæ* arctè imbricatæ, minores quam in flore fœmineo.

"*Strobili* cordiformes, solitarii, cernui, terminales, brevitèr pedunculati, capitis humani magnitudine: *squamæ* cuneiformes, glabræ, acumine longo subulato terminatæ, coriaceo-lignosæ.

"*Semina* cuneiformia, sæpiùs gibba, gemina, tegumento coriaceo castaneæ coloris.

"*Habitat* copiosissimè in sylvis Chili (Cordilleras de los Andes vulgò nominatis) et prope Araucum et in montibus Caramavida, Naguelbuta, Tucassel, Santa Barbara, Nacimiento, et juxta Oppidum Conceptionis Chili. Floret Septembri, Octobri, et Novembri. Appellatus vulgò Pino de Chile et Peguen.

"The wood of this tree is of a yellowish white, fibrous and full of very beautiful veins, capable of being polished and worked with facility. It is probably the best adapted for ship-building, as has been shown by the experiments made by Don Francisco Dendariarena in the year 1780, in consequence of which orders were given to supply the squadron commanded by Don Antonio Bacaro, then at anchor in the port of Talcaguano.

"The resin abounding in all parts of the tree is white, its smell like that

of frankincense, its taste not unpleasant. It is applied in plaster as a powerful remedy for contusions and putrid ulcers; it cicatrizes recent wounds, it strengthens fractures and relaxations, it mitigates head-aches, and is used as a diurectic (in pills) to facilitate and cleanse venereal ulcers. The Indians make use of the fruit of this tree as a very nourishing food; they eat it raw, as well as boiled and roasted; with it they form pastry, and distil from it a spirituous liquor. There are stated times to collect the fruit, which they preserve to make use of as required.

"Messieurs Lamarck and De Jussieu saw in Paris the specimens, which I had given to M. Dombey, and although Lamarck refers to them without mentioning the description, which I also gave to M. Dombey, I fear that he made no use of it, as Jussieu, the possessor of the specimens, in speaking of the female flowers, does not take upon himself to decide, whether the scales, which crown the nut, are stigmas or not; and which M. Lamarck says could only be determined in Chili. They proved without doubt, their talent and acuteness; but they had not the opportnnity I had, of examining the tree itself.

"I observed, amongst other things, that the interior of each scale had two ovaries, which Molina had also remarked; but the French professors said that it had only one, and, consequently, that the nut which followed in each scale was solitary. M. De Jussieu was, likewise, mistaken in calling the testa or covering of the nuts evalvular and without sutures. As far as relates to the anther, Jussieu certainly explained himself better than Lamarck; he says that they were ten or twelve, and I have always found them in greater number. I omit other mistakes, as they do not belong to the fructification, in which the characters above-mentioned ought to be reformed."

The preceding elaborate account is taken from a valuable paper of Don Joseph Pavon's, inserted in the first volume of the "Memoirs of the Royal Academy of Sciences of Madrid." In a letter which I have lately received, M. Pavon mentions an important particular, not noticed in the above description, namely, that the male tree is not half the size of the female, seldom exceeding 40 feet in height, with the leaves very much like those of the *Araucaria Brasiliana*, although of a different texture and colour. I am indebted to M. Pavon for native specimens of it, and for the drawing from which the greater part of the fine engraving accompanying this account in the larger work was taken. Figures A, D, E, and F, have been added from specimens collected in the neighbourhood of Conception in Chili, by Mr. Menzies in Vancouver's Voyage, and now deposited in the Banksian Herbarium.

I am indebted to Mr. Nugent, the British Consul in Chili, and also to Mr. Caldcleugh, for cones of this interesting tree. One of them, together with the nut separate, is represented at Tab. 57. The mature cones are with difficulty procured, from their liability to fall to pieces, and to be de-





Cone of the Ar





Araucaria Imbricata.

voured by birds and other animals. Many young plants have been lately imported from Chili, the seeds having been judiciously sown in boxes previous to their transportation; so that the tree is now no longer rare in our collections. As the tree appears to love a moist soil, perhaps, attention to this circumstance might facilitate its growth in this country. The largest specimens are those contained in the Royal Garden at Kew; they were raised from seeds brought home by Mr. Menzies. One of these trees planted in the open ground is now 12 feet high, and seems perfectly hardy; but I think it probable, that had it been planted in a moister situation, it would have been double the size.

EXPLANATION OF TAB. 56, 57.

a. Branch of the female tree.
b. Branch of the male tree terminated by a ripe Catkin.
c. Ripe Anthers.
d. Ovaries.
e. Section of a young male Catkin.
f, f, f. Young Anthers.
g. Full-grown Cone.
h. Seeds of ditto.
j. Nut terminated by its leafy appendage.
k. Kernel.

TAB. 58. 59, 60.

53. ARAUCARIA BRASILIANA.

BRAZIL PINE.

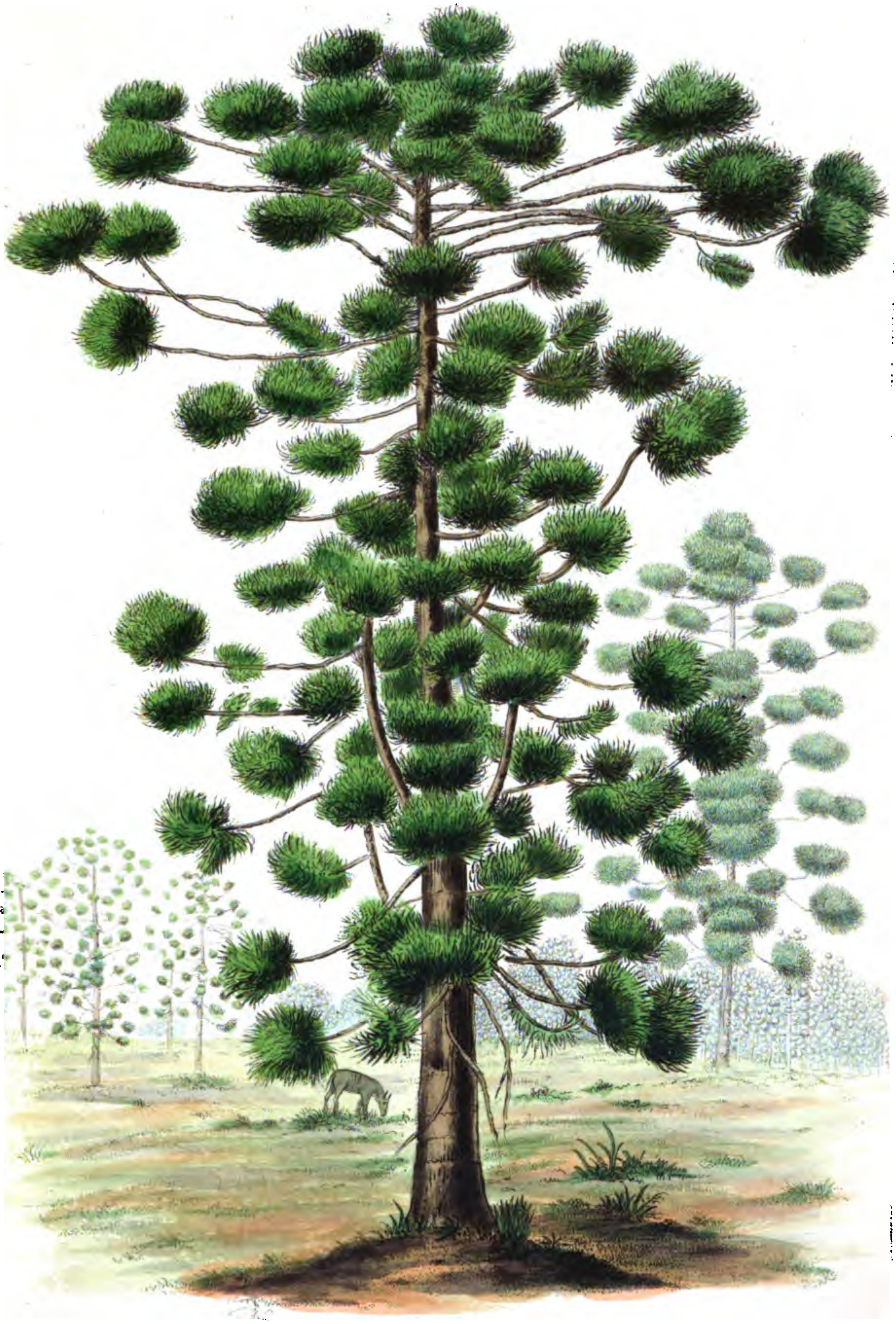
Araucaria Brasiliana, foliis laxè imbricatis lanceolatis mucronatis glauco-viridibus subtùs carinatis, amentis fœmineis subrotundo-ovalibus: squamis apice recurvatis.

Habitat copiosè in Brasiliæ montibus nemorosis Organos dictis, non procul ab urbe Rio de Janeiro.

DESCRIPTIO.

Arbor facie et mole *præcedentis;* sed magis laxa et diffusa. *Rami* numerosi, foliosi, approximati, nunc ferè verticillati. *Ramuli* (in *arbore juveni*) lenti, patuli, viminei, teretes, cortice viridi lævique obducti. *Folia* lanceolata, mucronata, integerrima, parùm cartilaginea, multò magis laxa, atque substantiâ triplò tenuiora quàm in præcedente, aliquantulùm lenta, glaberrima, suprà concava, lætè viridia, atque nitida, subtùs glauca et carinata, 1. v. 2 pollices longa, 3 lineas lata, utrinque sed præsertim subtùs lineis plurimis punctatis notata; arboris teneræ sparsa, patentia, lineari-lanceolata, attenuata, bipollicaria, vix 2 lineas lata. *Amenta mascula* nondùm vidi; *fœminea* subrotundo-ovalia, in apice ramulorum solitaria, sessilia, facie et magnitudine *Dipsaco sylvestri* similia: *squamis* crassis, compressis, cuneato-oblongis, quadrangulis, substantiâ firmâ suberosâ, supra receptaculum conico-cylindricum densè collocatis, singulis appendice lanceolatâ acutâ recurvatâ terminatis, ad basin lateris superioris intùs cavis, atque fœtâ nuce monospermâ instructis. *Nux* facie et colore omninò *præcedentis.*

The Chili and Brazil Pines have long been regarded as identically the same species; but a careful investigation proves them to be essentially different. The Brazilian species is characterized by its more spreading and branching habit; by its loosely imbricated, longer, glaucous-green leaves, which are of a much thinner and more flexible texture than those of *A. imbricata* and terminated by a less rigid point; and lastly, by the form of its female *amenta,* which are rounded-oval, with the scales terminated by a short, linear-lanceolate, acute, recurved appendage or scale. Its quick



Araucaria Brasiliana.



Araucaria Brasiliana.



Cone of the Araucaria Brasiliana.

and vigorous growth is also an important characteristic mark. The *Araucaria imbricata* is, on the contrary, of remarkable slow growth, with the leaves closely imbricated, very rigid, dark green on both sides, and of a thick coriaceous texture, cartilaginous at the margins. The scales of the female *amenta* are terminated by a much longer, broad-lanceolate, pointed, leafy-like appendage.

Baron Langsdorff, the Russian Consul General in the Brazils, was so kind as to send me some years ago a few seeds of the Brazilian Pine, from which I was fortunate in raising one plant, which is now eight feet high, and very luxuriant. It propagates freely by cuttings, and in that way I have obtained since, many young plants from that tree. Although of much quicker growth, it is evidently more tender than *imbricata*, and I fear that even in the most favourable situations, it will not endure our winters without protection.

Mr. Lee, some years ago, succeeded in raising several hundreds from seed, which he obtained from the Brazils; several of them are now from six to eight feet high. He also received an entire cone, which I was not fortunate enough to see; but from the description he gave me of it, it appears to have been of nearly the same shape and size with the Chili Pine, and like it, drooping. The nuts seldom succeed when sown, unless those obtained with the entire cone. They are sold as an article of food in the streets of Rio de Janeiro.

The specimen from which our drawing was taken, is in the possession of Dr. Sims, who kindly lent it me. It was collected in the Brazils by Mr. Sello, a naturalist, in the service of the king of Prussia.

EXPLANATION OF TAB. 58, 59, 60.

a. Branch of the female tree, with two young cones.
b. Leaf.
c. Ripe Cone.
d. Seed.

TAB. 61, 62.

54. ARAUCARIA EXCELSA.

NORFOLK ISLAND PINE.

ARAUCARIA EXCELSA, foliis subulatis patulis sulcatis; adultioribus arctè imbricatis inflexis muticis.

Araucaria excelsa.

Eutassa heterophylla. *Salisb. in Linn. Trans.* 8. *p.* 316.

Cupressus *columnaris*, foliis imbricatis subulatis sulcatis, strobilis cylindricis elongatis. *Forst. Fl. Ins. Aust. p.*

Dombeya excelsa. *Lamb. Mon.* 1 *ed. page* 87. *tab.* 39, 40.

THIS tree, which forms a very distinct species, is the tallest at present known, being, according to Governor Phillip, one hundred and sixty, and even one hundred and eighty feet in height: and Governor King informs us, he measured some in Norfolk Island which were two hundred and twenty-eight feet high, and eleven in diameter! It was first discovered by Captain Cook in his second voyage round the globe, on that extremity of New Caledonia, called Queen Charlotte's Foreland, and on a small neighbouring island, named by Captain Cook Botany Island, which is a mere sand bank, only three-fourths of a mile in circuit; also on another island, called by our voyagers the Isle of Pines, from its being almost covered with the above-mentioned tree.

A fine view of this may be seen in Cook's second voyage, vol. ii. 140, representing several of these very singular trees. His words are, " If I except New Zealand, I, at this time, knew of no island in the South Pacific Ocean, where a ship could supply herself with a mast or a yard, were she ever so much distressed for want of one. Thus far the discovery is or may be valuable. My carpenter was of opinion that these trees would make exceedingly good masts.

" The wood is white, close grained, tough and light. Turpentine had exuded out of most of the trees, and the sun had inspissated it into a resin, which was found sticking to the trunks, and lying about the roots. These trees shoot out their branches like all other pines: with this difference, that the branches of these are much smaller and shorter; so that the knots become nothing when the tree is wrought for use. I took notice that the largest of them had the smallest and shortest branches, and were crowned as it were, at the top, by a spreading branch like a bush. This was what led some on board into the extravagant notion of their being basaltes."

Forster, speaking of them in his account of the above voyage, says, " Peculiar to Norfolk Island, and to the east end of New Caledonia, we



Araucaria Excelsa.

found a species of coniferous tree, from the cones seeming probably to be a cypress; it grows here to a great size, and is very heavy, but useful timber."

In Captain Hunter's *Journal of the Transactions at Port Jackson and Norfolk Island*, p. 194, we have also the following excellent account. "The Pines, which have been particularly spoken of by Captain Cook, and by others, who have lately visited this island, are the most conspicuous of any trees here; they grow to a prodigious size, and are proportionably tall, being from one hundred and fifty to two hundred feet, and in circumference from twelve to fourteen feet, some to twenty-eight and thirty feet.

"These trees, from their immense height, have a very noble appearance, being in general very straight, and free from branches, to forty, sometimes sixty feet, above the ground; they have been by some thought fit for masts, for ships of any size; in length and diameter they certainly are, but with respect to quality they are, in my opinion, wholly unfit; even admitting them to be sound, which, from experience, I know is seldom the case. I employed the carpenters of the Sirius while here, to cut down a few sticks, which it was intended should be sent home by the first opportunity, in order for trial in His Majesty's dock-yards, to see if they were, as has been said, fit for His Majesty's navy or not.

"In providing a top-mast and a top-sail-yard for a seventy-four gun ship, a thirty-two, a twenty, or a sloop, and one rough spar, in all seven sticks, thirty-four trees were cut down, twenty-seven of which were found defective. When these trees were falling, it was observed that most of them discharged a considerable quantity of clear water, which continued to flow at every fresh cut of the axe; there is no turpentine in these trees but what circulates between the bark and body of the tree, and which is soluble in water. It is a very short-grained and spongy kind of timber, and I think fit only for house-building, for which we know it to be very useful.

"When fresh cut down, five out of six will sink in water, the wood is so exceedingly heavy: and, if we suppose for a moment, that great part of the pine timber were fit for naval purposes, the great difficulty, and indeed I may say impossibility, of getting it from the interior parts of the island to the sea, would render it of little value, if designed for masts; but if for plank, it could be cut up where fallen. Those which grow on the south-east point of the island, where the land is low, are those which have hitherto been made use of."

At p. 389 of the same work, is another very interesting account, from the journal of Lieutenant (now Governor) King: he there says, "The pine trees are of a great size, many of them being from one hundred and eighty, to two hundred and twenty feet high, and from four to eight feet diameter, some distance from the ground. Those trees which measure from one hundred to one hundred and eighty feet high, are in general sound, and

are without branches for eighty or ninety feet, but the upper part is too knotty and hard to be useful; indeed, it frequently happens, that after twenty feet have been cut off from the butt, the trees become rotten and shaky, and are also very brittle; for which reason, no dependance can be put on them for masts or yards.

"The turpentine which exudes freely from the bark, is of a milk-white glutinous substance; but it is rather remarkable, that there is none in the timber. We tried to render this turpentine useful in paying boats, and other purposes, but without success; as it would neither melt nor burn: we also tried to make pitch or tar, by burning the old pines; but there being no turpentine in the wood, our efforts were useless.

"The pine is very useful in buildings, and being dispersed in various parts of the island, is well calculated for such buildings as hereafter may be necessary: from what I have been able to observe, it is very durable, as that which we had used for erecting houses stood the weather very well."

That excellent botanist Mr. Brown, who was on board the Investigator with Captain Flinders, in his late voyage of discovery round New Holland, informs me, that they found this tree growing in great abundance on several parts of the east coast; but that he could not find any in fructification: those he saw were not above sixty or seventy feet in height. A bay on the above-mentioned coast, from the great abundance of these trees found there, they named the Bay of Pines. A beautiful drawing of this spot, by Mr. William Westall, landscape painter on board the above-mentioned ship, was in the Exhibition in 1805.

A few of these trees are now in the gardens of the curious about London; they thrive exceedingly well in our green-houses, grow very fast, and are one of the greatest ornaments of our collections. They can be increased by cuttings, but with great difficulty; and never by this method make handsome plants.

A most beautiful specimen, and the largest in this kingdom, is now in the Royal Gardens at Kew, to which it was first introduced by Governor Phillip.

Fig. a. some botanists have suggested might belong to another species, because the branches are somewhat smaller than others that have been brought from Norfolk Island; but this can now no longer remain a doubt, since that place has been so well explored by that accurate botanical draughtsman, Mr. Ferdinand Bauer.

I must here observe a remarkable peculiarity belonging to the *Coniferæ* of the southern hemisphere, which is, that while the trees are young their leaves are young and divaricating, but when they become old enough to bear fruit, those leaves fall off, and are succeeded by short scales closely imbricated on the branches, so that seeing them in their different states, one could hardly suppose it possible that they could belong to the same species. This is very remarkable in one of the species of *Dacrydium*, from

New Zealand, where the leaves, whilst the tree is young, have the appearance of the common yew, (*Taxus baccata,*) but become imbricated scales, and somewhat resembling *Juniperus Virginiana,* when the tree grows older.

The Moreton Bay Pine, discovered by Mr. Allan Cunningham, whose name it justly bears, appears from a fine specimen I possess, to be decidedly distinct from *A. excelsa.* Plants of this new species are now at Kew, and in other collections. I hope at a future time to give a description and plate of it.

TAB. 61, 62.

a. Part of a branch from Norfolk Island.
b. Branch with leaves of the first growth, from the Kew Garden, the plant brought from Norfolk Island.
c. Cotyledons (which are always four in number) from Norfolk Island.
d, d. Scales of a very young Cone belonging to branch a.
e. Scale magnified.
f. Represents a branch in Sir Joseph Banks's Herbarium, brought home by Captain Cook, marked " Nova Caledonia, Isle of Pines. W. Anderson, 1774."
g. Ripe Cone from Norfolk Island.
h. Scale separate.
i. Rachis of the Cone, reduced to half its natural size, showing the disposition of the Scales.
k. Tranverse section of a Scale, showing the seed.

TAB. 63.

TAXODIUM DISTICHUM.

DECIDUOUS CYPRESS.

TAXODIUM *(Rich.)* *Flores* monoici, in eodem ramulo. *Amenta mascula* subrotunda: *fœminea* subrotunda-ovata: *squamis* ovatis, acutis, tenuissimè serrulatis, bifloris. *Antheræ* 3-5, globosæ, bivalves, basi, squamarum adnatæ. *Galbulus* subrotundus: *squamis* peltatis, lignosis. *Nuces* trigonæ, testâ ligneâ. *Albumen* parcum, carnosum. *Embryo* teres, polycotyledoneus: *cotyledones* 6-7, subtriquetræ: *radicula* albuminis ferè longitudine, cylindracea, cotyledonibus ferè dùplò longior, supera, apice mucronulata.

Arbores (Amer. boreal.), *proceræ*, *elegantes*, *facie* Taxi. Ramuli *pennati*, *patuli*. Folia *linearia*, *plana*, *pectinato-disticha*, *decidua*. Amenta mascula *racemoso-paniculata!* fœminea *pauca*, *ad basin paniculæ masculinorum*.

Taxodium distichum. *Rich. in Ann. du Mus.* 16. *p.* 298. *Conif. p.* 143. *t.* 10.

Cupressus disticha. *Linn. Sp. Pl.* 1422. *Hort. Cliff.* 499. *Gron. Virg.* 153. *Mich. Fl. Amer. Bor.* 2. *p.* 208. *Arb.* 3. *p.* 4. *t.* 1. *Pursh. Fl. Amer. Sept.* 2. *p.* 645.

Cupressus Americana. *Catesb. Car.* 1. *p.* 11. *t.* 11.

C. *virginiana*, foliis Acaciæ deciduis. *Comm. Hort.* 1. *p.* 113. *t.* 59.

C. *virginiana*, foliis Acaciæ cornigeræ paribus et deciduis. *Pluk. Alm.* 125. *t.* 85. *f.* 6.

Habitat in Americæ borealis australioribus, locis paludosis.

DESCRIPTIO.

Arbor 120 pedes alta. *Truncus* crassissimus, sæpè diametro 25-40 pedum. *Ramuli* delicatuli, elegantissimè pennati, cortice brunneo rufescente. *Folia* pectinato-disticha, basi contortâ horizontaliter patentissima, linearia, mucronulata, plana, uninervia (nervo suprà depressiusculo,) utrinque glabra, colore jucundissimè viridia, marginibus acutis, exteriore convexiusculo, semipollicaria et ultrà, vix lineam lata. *Amenta mascula* subrotunda, racemoso-paniculata: *squamis* brevissimis, obtusis, concavis, carinatis, margine membranaceis. *Galbuli* subrotundi v. subrotundo-ovales, magnitudine *Ovi columbini*.

THE great difference in habit existing between the *Cupressus disticha* of Linnæus and the other species referred by him to that genus, induced



Taxodium distichum.

M. Richard* to form it into a separate genus, to which he gave the name of *Taxodium*. Two years afterwards Messrs. Mirbel and Schoubert described it under the name of *Schubertia*.† The very different habit of the trees themselves, the disposition of the male flowers, and the structure of the female ones, will readily distinguish this genus from *Cupressus*, to which most botanists have hitherto referred it. On my way from the country in the beginning of November 1823, I was fortunate in meeting with a single tree of *Taxodium distichum* bearing plenty of ripe fruit, in the garden of a blacksmith opposite the King's Arms, Bagshot. I was delighted with my discovery, as I never had before the pleasure of meeting with this interesting tree in fruit, a circumstance of very rare occurrence in this country. The garden is the property of Mr. Rogers, innkeeper, at Southampton. At the parsonage in the vicinity of Bagshot, there are two trees of the *Taxodium*, even larger than the one in the blacksmith's garden, but on them I was able to find a single cone only. I am in possession of several native specimens with male flowers, collected by Mr. Nuttall on the banks of the Missouri, and others from Mexico sent me by M. Pavon. The North American and Mexican specimens appear to me to belong decidedly to one and the same species as Humboldt has already rightly determined.

M. Michaux observes, in his North American Sylva, p. 329, that this species is the most interesting of its genus, for the varied application of its wood, the majesty of its form, and for its extraordinary dimensions in a favourable soil and climate.

"The banks of Indian river, Delaware, in lat. 38° 50′ may be assumed as its northern boundary. Southward, it is more abundant in the swamps: but in Maryland and Virginia, where the winter is milder and the summer more intense, it is confined to the vicinity of the sea.

"Beyond Norfolk, its limits coincide exactly with those of the *Pine Barrens*, and in the Carolinas and Georgia, it occupies a great part of the swamps which border the rivers. In East Florida, where the soil is more uniform, the long-leaved Pine, and the Cypress, accompanied by a variety of other trees, are more abundant, the one on the low grounds, and the other on the uplands. In Louisiana, those parts of the marshes where the Cypress grows, almost alone, are called Cyprieres, (Cypress swamps,) occupying sometimes thousands of acres.

"In the Floridas, the swamps are contiguous to immeasurable plains covered with Pines, in the midst of which is seen here and there a bog, or a swamp filled with Cypresses, whose squalid appearance, when they exceed eighteen or twenty feet in height, proves how much they are affected by the barrenness of a soil, which differs from the surrounding waste only by a layer of vegetable mould, a little thicker upon the quartzous sand.

* Annal. du Museum XVI. p. 269.
† Nouv. Bull. dela Soc. Philom. III. p. 123.

"From these particulars a sufficient idea may be formed of its geographical distribution, extending over more than fifteen hundred miles from its first appearance towards the north, to the Mississippi. Towards the southwest, my information does not extend beyond Louisiana; though I have reason to believe, that it is seen as far as the mouth of the river Del Norte, latitude 26°, which, if we measure the circuit of the gulf of Mexico, makes the distance more than three thousand miles.

"In the swamps of the southern states, on whose deep miry soil a new layer of vegetable mould is every year deposited by the floods, the Cypress attains its utmost development. The largest stocks are one hundred and twenty feet in height, and from twenty-five to forty feet in circumference above the conical base, which, at the surface of the earth, is always three or four times as large as the continued diameter of the trunk: in felling them, the negroes are obliged to raise themselves upon scaffolds five or six feet from the ground. The base is usually hollow for three quarters of its bulk, and is less regularly shaped than that of the Large Tupelo. Its surface is longitudinally furrowed with deep channels, whose ridges serve as cramps to fix it more firmly in the loose soil. The roots of the largest stocks, particularly of such as are most exposed to inundation, are charged with conical protuberances, commonly from eighteen to twenty-four inches, and sometimes four or five feet in thickness: they are always hollow, smooth on the surface, and covered with a reddish bark like the roots, which they resemble, also, in the softness of their wood; they exhibit no sign of vegetation, and I have never succeeded in obtaining shoots by wounding their surface and covering them with earth. No cause can be assigned for their existence; they are peculiar to the Cypress, and begin to appear when it is twenty or twenty-five feet in height; they are not made use of except by the negroes for bee-hives. The summit of the Cypress is not pyramidical like that of the Spruces, but is widely spread and even depressed upon old trees. The foliage is open, light, and of a fresh agreeable tint: each leaf is four or five inches long, and consists of two parallel rows of leaflets upon a common stem. The leaflets are small, fine, and somewhat arching, with the convex side outwards. In the autumn they change from a light green to a dull red, and are shed soon after. Boiled during three hours in water they afford a fine durable cinnamon colour: such at least has been the result of several experiments made in Europe.

"The Cypress blooms in Carolina about the first of February. The male and female flowers are separately borne by the same tree, the first in flexible pendulous aments, and the second in bunches scarcely apparent. The cones are about as large as the thumb, hard, round, of an uneven surface, and stored with small, irregular, ligneous seeds, containing a cylindrical kernel: they are ripe in October, and retain their productive virtue for two years.

"The wood is fine-grained, and, after being for some time exposed to the light, of a reddish colour: it possesses great strength and elasticity, and

is lighter and less resinous than that of the Pines. To these properties is added the faculty of long resisting the heat and moisture of the southern climate. The colour of the bark and the properties of the wood vary with the nature of the soil; the stocks which grow near the natural bed of the rivers, and are half the year surrounded with water to the height of three or four feet, have a lighter coloured bark than those which stand retired in places which the waters do not reach, or where they sojourn but a moment. The wood, also, is whiter, less resinous and less heavy. These are called *White Cypresses*. The others, of which the bark is browner and the wood heavier, more resinous, and of a duskier hue, are called *Black Cypresses*. When destined to be employed in the arts, both varieties should be felled in the winter, and kept till, by a long process, the wood has become perfectly dry. A resin of an agreeable odour and a red colour exudes from the Cypress; it is not abundant enough to be collected for commerce, though more copious than that of the White Cedar, which is probably the reason of the wood's being denser and stronger: the negroes prefer it to that of the Pines as a dressing for suppurating wounds.

"At Norfolk in Virginia, near the *Dismal Swamp*, immense quantities of shingles were made both from this species and the White Cedar; those of the Cypress, if made from trees felled in the winter, will last forty years. They are split off in a direction parallel to the concentrical circles. The consumption of them in the French, English, and Danish colonies, was estimated at one hundred millions annually. They are twenty-two or forty-four inches long, and from three to six inches wide. The Pine in Philadelphia was from four to five dollars a thousand; and they usually bore a double price in the West-Indies.

"M. de Humboldt, in his interesting account of New Spain, mentions several trees of this species in the ancient gardens of the Emperor of Mexico, which were planted before the arrival of the Spaniards, and are now of considerable size."

The largest and finest trees of the *Taxodium distichum*, in this country, are those belonging to His Grace the Duke of Northumberland, at Sion-House.

Figures a, b, c, d, are copied from M. Richard's excellent memoir.

EXPLANATION OF TAB. 63.

a. Panicle of Male Catkins.
b. Male Catkin magnified, showing the anthers.
c. Female Catkin.
d. Scale of the same magnified to show the stigmas.
e. Ripe fruit.
f. Scale, showing the attachment of the seeds.
g. Seed separate.

TAB. 64.

TAXODIUM SEMPERVIRENS.

EVERGREEN TAXODIUM.

TAXODIUM SEMPERVIRENS, foliis distichis linearibus acutis perennantibus coriaceis glabris opacis.

Habitat in Orâ occidentali Americæ borealis. *Mensies.*

DESCRIPTIO.

Arbor sempervirens. *Ramuli* angulati, foliosi, glabri. *Folia* lineari, acuta, disticha, coriacea, glabra, utrinque opaca, lucida, subtùs nervo medio carinata, margine plana, semi vel nunc ferè pollicem longa, semilineam lata, basi decursiva. *Galbuli* terminales solitarii, subrotundi, basi squamus brevibus imbricatis muniti: *squamis* trapezoideis, peltatis, crassis, fungoso-lignosis, suprà rugosis, atque radiatim striatis, centro depressis, basi in pedicellum crassum angulatum desinentibus. *Semina* ad singulam squamam numerosa, angulata, gilva.

Having only a single imperfect specimen of this species for examination, it is not without some hesitation, that I have referred it to *Taxodium*. I have thought the plant too interesting, however, to omit in the present work, leaving it to future observations to determine, whether or not the place I have assigned to it be correct.

The tree appears intermediate between *Taxodium* and *Cupressus*, agreeing with the latter in the indefinite number of its seeds. The late Mr Salisbury considered it as forming a new genus, and had applied to it the name of *Condylocarpus*.

This plant, I propose to call *sempervirens*, from its evergreen leaves, so different from the *Taxodium distichum*, whose leaves are deciduous.

I have been enabled to give the accompanying figure from a specimen obligingly communicated to me by my friend Mr. Menzies, who collected it on the north-west coast of America during his voyage on board the expedition of the celebrated Vancouver.



CUPRESSUS.

FLORES AMENTACEI MONOICI.

MASCULI.

CALYX. *Amentum* ovatum, squamosum, squamis, oppositis, pedunculatis, quadrifariam imbricatis, subpeltatis, carinatis, acuminatis, inflexis.

COROLLA nulla.

STAMINA. *Filamenta* nulla. *Antheræ* quatuor, oblongæ, uniloculares, basi squamarum adnatæ.

FŒMINEI.

CALYX. *Strobilus* depressus, foliis obvallatis, constans *squamis* lanceolatis, sessilibus.

COROLLA nulla.

PISTILLUM. *Germina* plurima, subrotunda, compressa, stigmatibusque coronata, sessilia. *Styli* nulli. *Stigmata* prominentia, subcylindracea, truncata, apicibus concavis.

STROBILUS squamosus, subglobosus, squamis quadrifariam oppositis, pedunculatis, peltatis vel angulatis, extrorsùm convexis, mucronatis, induratis coarctatis, demùm dehiscentibus.

SEMINA oblongo-ovata, angulato-compressa, alata, pedunculis crassis squamarum (ad singulum 4-30) seriatìm affixa, dehiscentibus squamis decidua.

TAB. 65.

57. CUPRESSUS LUSITANICA.

CEDAR OF GOA.

CUPRESSUS LUSITANICA, ramis flexuosis patentibus, ramulis quadrangulis, foliis quadrifariam imbricatis acutis carinatis glaucis adpressis.

C. *lusitanica*, ramulis quadrangulis, foliis quadrifariam imbricatis adpressis. glaucis carinatis, strobilis subglobosis, squamis mucronatis, ramis pendulis. *Willd. Sp. Pl.* 4. *p.* 511.

C. *glauca*, foliis quadrifariam imbricatis, acutis; ramis patentissimis, infimis subdependentibus. *Brot. Fl. Lusit.* 1. *p.* 216.

C. *pendula*, foliis imbricatis glandulosis, frondibus quadrangulis glaucis, ramis dependentibus. *L'Herit. Stirp. Nov. p.* 15. *t.* 8. *Hort. Kew.* 3. *p.* 373.

C. *glauca*, foliis acutis glaucis glandulosis quadrifariam imbricatis, ramis dependentibus. *Lam. Enc. Meth.* 2. *p.* 243.

C. *lusitanica*, foliis imbricatis apicibus aculeatis, ramis dependentibus. *Mill. Dict. No.* 3.

C. *lusitanica*, patula, fructu minori. *Tourn.* 587. *Duham. Arb.* 1. *p.* 19.

Habitat Goæ in Indiâ Orientali, nunc in Lusitaniâ.
Floret Autumno.

DESCRIPTIO.

Arbor ramosa, procera, altitudine 50 pedum, et ultrà. *Rami* sparsi, inordinati, flexuoso-patentes. *Ramuli* incurvati numerosissimi junioribus quadrangulis, foliis undique tectis; adultioribus teretibus. *Folia* squamiformia, subamplexicaulia, basi lata, sursùm attenuata, subulata, diu persistentia: *juniora* quadrifariam imbricata, glauca, dorso glandulâ resinosâ concavâ longitudinaliter exarata; *seniora* remotiuscula, vix imbricata, rigida, demùm arida, rufa. *Amenta mascula* numerosa, ovata, obtusè octangula, terminalia, solitaria, e viridi-lutea, lineas ferè duas longa: Squamæ circiter 20 convexo-concavæ, luteæ, apice extus subviridi. *Amenta fæminea* solitaria, foliis circumcincta, depressa, minuta. *Strobilus* ovato-globosus, rugosulus, muricatus, magnitudine fructûs *Pruni spinosæ*, farinâ cæsiâ conspersus. *Squamæ* octo-angulatæ, mucronibus elongatis, reflexis. *Semina* gilva.

The branch represented in Plate 65, was from a tree growing in my conservatory, where it produced some hundreds of cones when not more than twelve feet high, the air of Wiltshire being much too cold for it unless protected in winter; yet I have seen it at the Marquis of Blandford's, at White Knights, flourishing all the year without any shelter, except that of other trees keeping the wind from it, and thriving equally well as with me at Boyton when under cover.

Although we are informed in the Hortus Kewensis, from Ray's Letters, that this tree was cultivated in England so long ago as the year 1683, yet it is still very scarce; nor have I met with it any where but at White Knights, where there are several young trees of it now in a very flourishing state; but as Mr. Lee at Hammersmith, of whom I procured mine some years ago, had at that time several more for sale, I should suppose that it must be in other collections.

Brotero informs us, that in Portugal this tree grows much faster than the



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common Cypress (C. sempervirens), but is of shorter duration, and its timber of a shorter texture.

Miller's account of this species is as follows: "The third sort (C. lusitanica) is at present pretty rare in the English gardens, though of late years there have been many plants raised here; but this sort is not quite so hardy, I fear, as the common Cypress, for the plants are frequently killed, or greatly injured, in severe winters; and in the hard frosts in 1740, there was a large tree of this kind entirely killed, in the gardens of his Grace the Duke of Richmond, at Goodwood in Sussex, which had been growing there several years; and in the year 1762 many large trees were killed. There are great plenty of this trees growing at a place called Busaco, near Coimbra, in Portugal, where this tree is called the Cedar of Busaco; and there it grows to be a timber tree, so that from thence the seeds may be easily procured.

"This tree grows naturally at Goa, from whence it was first brought to Portugal, where it has succeeded and been propagated; formerly there were some trees of this sort growing in the Bishop of London's Garden, at Fulham, where it passed under the title of Cedar of Goa, by which it was sent from thence to the Leyden Garden with that name." *Miller's Dict. l. c.*

EXPLANATION OF TAB. 65.

a. Male Catkin, magnified.
b. Scale of the same.
c. Female Catkin, magnified.
d. Germen and stigma, magnified.
e. Scale of a half grown cone with the seeds.
f. One of the seeds, magnified.
g. Ripe Cone.
h. Scale of the same.
i. Seed.

124

TAB. 66.

58. CUPRESSUS PENDULA.

WEEPING CYPRESS.

Cupressus Pendula, ramulis ancipitibus foliosis; primariis longissimis pendulis; novissimis brevibus alternis bifariam patentibus.

C. *pendula*, foliis oppositis ovatis ramulis dichotomis pendulis. *Thunb. Fl. Jap. p.* 265. *Willd. Sp. Pl.* 4. *p.* 512.

C. pendula. *Staunton's authentic Account of an Embassy from the King of Great Britain to the Emperor of China, Vol.* 2. *p.* 525. Weeping Thuja, or lignum vitæ. *Idem. p.* 445. *et tab.* 41.

Fi-moro. Juniperus julifera, julis squamosis croceo polline refertis, baccis Sabinæ angulosis. *Kæmpf. Amœn. Exot. p.* 883.

Habitat in Chinâ et Japoniâ.
Floret......

Arbor comâ amplâ, expansâ. *Rami* dichotomi, laxi, aphylli, valde ramulosi: ramuli longi, compressi, penduli, foliis arctissime tecti, iterùm divisi, secundariis brevibus, patulis. *Folia* quadrifariam imbricata, semiamplexicaulia, subtriquetra, carinata, adpressa. *Amenta mascula* numerosa, ovata, lineâ vix longiora, in apicibus ramulorum solitaria, sessilia; *fœminea* depressa, minuta foliis patulis cincta, ramulos inferiores brevissimos terminantia. *Strobilus* fuscus, magnitudine fructûs *Pruni spinosæ*. Squamæ octo-angulatæ, mucronibus obtusis. *Semina* gilva.

This elegant tree was discovered in Japan, and first made known to Europeans by the illustrious Kaempfer, and again found there, on the mountains of Fakonia, by Thunberg, who remarks, that its exceedingly long and numerous pendant branches give it a very remarkable and beautiful appearance, very different from the other ever-greens of the same natural order. This naturalist, however, found but one tree, and neither saw the flowers nor the fruit.

In Plate 41 of the Account of the Embassy to China, in the View of Vale of Tombs, it is represented as overhanging the monuments of departed greatness; nor, whether we consider its dark hue, or drooping pensile form, would it be easy to conceive any thing more in sympathy with the scene. No doubt it would also prove a great ornament to our gardens, into which



Cupressus pendula.

it has not yet been introduced; but most probably we may soon be indebted for it to that skilful gardener, Mr. Kerr, now employed in a mission to China for the purpose of collecting plants for the Royal Gardens at Kew, and who has already sent over a number of new and beautiful species from that interesting country.

The specimens represented in Tab. 67 were obligingly given to me by Sir George Staunton, Bart. who collected them while engaged in the celebrated Embassy to China. They agree so well with Thunberg's description of his *Cupressus pendula* above quoted, that, although I have not had an opportunity of comparing them with each other, I have still considered them as the same species.

Those possessing Japanese specimens will easy determine it from the figure.

EXPLANATION OF TAB. 66.

a. Cone and branch magnified.
b. Seed natural size.
c. The same magnified.

59. CUPRESSUS TORULOSA.

BHOTAN CYPRESS.

C. Torulosa,* foliis ovatis obtusis quadrifariam imbricatis, galbulis globosis pedicellatis: squamis umbonatis, ramulis teretibus torulosis divaricatis confertissimis patentibus.

Habitat in Indiâ Orientali *(Roxburgh)*, in Bhotaniâ. *W. S. Webb.*

DESCRIPTIO.

Arbor pulchra, pyramidata, ramosissima, cortice brunneo deciduo tecta. *Rami* conferti, assurgentes. *Ramuli* confertissimi, teretes, divaricati, patentes torulosi, 2-6 pollices longi, undique foliis crebrè imbricati. *Folia* minuta, ovata, obtusa, convexa, lævissima, quadrifariam imbricata, omninò adpressa, viridia; *adultiora* persistentia atque simul cum cortice decidua. *Amenta mascula* nondùm nisi novella vidi; hæc in summo ramulorum minorum numerosa, clavata, tetragona, imbricata. *Galbuli* globosi, pedicello brevissimo squamoso suffulti, picei coloris, rore glauco cœrulescentes: *squamis* trapeziformibus, medio umbonatis, crassis, lignosis.

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60. CUPRESSUS NOOTKATENSIS.

NOOTKA CYPRESS.

C. Nootkatensis, ramulis tetragonis, foliis latè ovatis acutis dorso convexis quadrifariam imbricatis appressis, galbulis globosis subsessilibus: squamis umbonatis lævibus.

Habitat ad Sinum Nootka dictum, in Plagâ occidentali Americæ borealis. *Mensies.*

DESCRIPTIO.

Arbor..........*Rami* teretes, patuli, foliis emarcidis squamati, cortice rufo tecti. *Ramuli* numerosi, subdistantes, tetragoni, breves, patuli. *Folia* latè ovata, acuta, valdè coriacea, glabra, nitida, arctè appressa, quadrifariam imbricata, dorso convexa; *adultiora* apice brevè subulata. *Galbuli* globosi, laterales, magnitudine *Cerasi sylvestris*, rore glauco cœrulescentes, pedicello brevissimo squamoso ramulis simili suffulti: *squamis* trapeziformibus, peltatis, lævibus, centro umbonatis.

61. THUJA PLICATA.

NÈE'S ARBOR VITÆ.

Thuja Plicata, ramulis compressis patulis, foliis rhombeo-ovatis acutis adpressis quadrifariam imbricatis nudis medio tuberculatis, strobilis oblongis nutantibus, seminibus obcordatis.

Thuja plicata. *Donn Hort. Cantab. ed.* 6. *p.* 249.

Habitat in Novâ-Hispaniâ. *(D. Clariss. Ludovicus Nèe)*, in Plagâ occidentali Americæ borealis, ad Sinum Nootka dictum. *Menzies.*

DESCRIPTIO.

Arbor ramosissima, diffusa; lætè-virens. *Rami* patentes conferti, cortice rubro-fusco obducti. *Ramuli* densi, patuli, iterùm et iterùm divisi, pectinati, compressi. *Folia* rhombeo-ovata, acuto, arctè adpressa, quadrifariam imbricata, approximata absque internodiis, glabra, integerrima, nitida, medio tuberculata. *Strobili* sparsi, solitarii, nutantes, oblongi: *squamis* ellipticis, obtusis, planis, obsoletè sulcatis. *Semina* compressa, undique alata, apice emarginata! obcordato-oblonga.

The specimens of this species, collected in the expedition under Malaspina, by Don Luis Nèe, although marked from New Spain, are most likely from Nootka Sound, where the tree was observed by Mr. Menzies, to whom, it is probable, we are also indebted for its first introduction to our collection, as there does not appear to be any marked difference between the wild and cultivated samples, unless that the branches of the latter are broader and more compressed.

62. THUJA CHILENSIS.

CHILI ARBOR VITÆ.

THUJA CHILENSIS, ramulis articulatis patulis compressis, foliis ovali-oblongis obtusis subtrigonis quadrifariam imbricatis appressis nudis utrinque sulcatis, strobilis ovali-oblongis: squamis 4 compressis ellipticis obtusis, seminibus apice alatis integris.

Cupressus Thujoides. *Pavon MSS.*

Habitat in Andium Regni Chilensis montibus. *Lodovicus Nèe, Pavon.*

DESCRIPTIO.

Arbor pulcherrima, cœrulescens, diffusa. *Rami* numerosi, patentissimi, cernui, cortice cinereo-fusco vestiti. *Ramuli* ad apices ramorum confertissimi, variè divisi, compressi, articulati. *Folia* ovali-oblonga, obtusâ, subtrigona, quadrifariam imbricata, appressa, nuda, subdistantia, internodiis præsertìm in *adultioribus* distinctis, glabra, ad latus utroque sulco lato depresso dealbato exarata, basi arctissimè juncta, ramulos vaginantia. *Strobili* numerosi, terminales, cernui, oblongi, compressi, quadrivalves: *valvis exterioribus* ovato-oblongis, cymbiformibus, apice acutiusculis, extùs convexis, lævibus, paullò infra apicem tuberculo prominenti auctis; *interioribus* 2 *oppositis* spathulatis, apice complanatis, rotundatis, tuberculo minori, nunc ferè obsoleto, instructis, tantùm fertilibus. *Semina* 2, subinde omninò 4, basi valvarum interiorum inserta, apice alâ latiori scarioso-membranaceâ, obtusissimâ, basibus decurrentibus, ornata.

THIS elegant species belongs to the same section as the *Thuja occidentalis* and *plicata*, which are distinguished by their oblong, compressed fruit, composed of a definite number of scales, and by their flat, winged seeds. The genus may be very conveniently distributed into three groups, characterized by the form and structure of their fruit and seeds, which also afford the most certain marks for distinguishing the species. I subjoin the characters of these groups.

1. THUJÆ VERÆ. *Strobili* oblongi, compressi: *squamis* definitis (4 v. 6), coriaceis, lævibus, sub apice unituberculatis; *exterioribus* 2, abbre-

abbreviatis, cymbiformibus. *Semina* compressa alata. *Hùc* T. occidentalis, *L.* chilensis, *nobis,* plicata, *nobis.* Obs. In T. occidentali semina complanata, undique alata, apice emarginata.

2. Biota. *Strobili* subrotundi, squarrosi: *squamis* indefinitis, peltatis, lignosis. *Semina* ventricosa, crustacea, aptera. *Hùc* T. orientalis, *L.*
3. Cyparissa. *Strobili* subrotundi: *squamis* indefinitis, peltatis, lignosis. *Semina* apice alata. *Hùc* T. cupressoides, *L.* pensilis, *nobis,* pendula, *nobis.*

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63. THUJA PENSILIS.

Thuja Pensilis, foliis alternis trifariis trigonis subulatis, strobilis obovatis: squamis cuneatis tuberculatis, ramis filiformibus erectis.

Thuja pensilis. *Staunton's Embassy to China,* p. 436.

Habitat in Chinâ. *Georgius Staunton.*

Arbor elegans, ramomissima. *Ramuli* confertissimi, filiformes. *Folia* sparsa, trifaria, patula, trigona, acutè carinata, apice mucronulata, 2-3 lineas longa, lætè viridia; *juniora* in apice ramulorum crebriora, breviora, adpressa. *Galbuli* pyriformes, majores, multivalves: *squamis* cuneatis, crassis, lignosis, extùs muricatis, margine crenatis. *Semina* apice alata.

TAB. 67.

64. THUJA PENDULA.

THUJA PENDULA, foliis decussato-oppositis patulis lanceolatis mucronulatis carinatis subdistantibus, strobilis globosis: squamis convexis lævibus, ramis filiformibus pendulis.

Habitat in Tatariâ.

DESCRIPTIO.

Arbor (viridario culta) orgyalis. *Rami* longissimi, filiformes, directè ac pulcherrimè penduli, lætè virides.

Strobili globosi, magnitudine *Cerasi sylvestris*, 6-valves; *valvis* subrotundis crasissimis, fungosis, extùs convexis, lævibus.

A PLANT of this beautiful new species is now growing in the conservatory at Boyton, and the only one perhaps in Europe.

The plant was obtained from Messrs. Loddiges, at Hackney, who were informed it was a native of Tartary. If so, it is most probably from that part of it, which is included within the Chinese empire, as it is nearly related to the preceding species, which is known to come from the latter country.

EXPLANATION OF TAB. 67.

a. } Fruit.
b. }



Thuja pendula.



Thuja dolobrata.

TAB. 68.

65. THUJA DOLOBRATA.

BROAD-LEAVED ARBOR VITÆ.

THUJA DOLOBRATA, ramulis ancipitibus, strobilis squarrosis, foliis latè ovatis obtusis trifariam imbricatis subtùs excavatis niveis.

Thuja dolobrata. *Linn. Suppl.* p. 420. *Thunb. Jap.* p. 266. *Willd. Sp. Pl.* 4. p. 509.
Kwai. *Kæmpf. Amœn.* 884.

Habitat in Japoniâ, in regionibus Fakoniæ et Oygawæ, inter Miàco et Jedo. *Kæmpfer, Thunberg.*

Arbor altissima, vasta et pulcherrima. *Ramuli* numerosissimi, alterni, complanati, variè divisi. *Folia* trifariam imbricata, ovata, obtusa, crassa, quàm in cæteris speciebus plurimùm majora, suprà convexa, pulchrè viridia, lucida, medio sulcata, subtùs concava, marginata, nivea. *Strobili* squarrosi.

IT is with much satisfaction that I have been enabled to give a plate of this highly interesting and little known species, which Thunberg justly describes as "Pulcherrima omnium Sempervirentium Arbor." Kæmpfer was the first European writer who makes mention of this tree; but his notice of it is so short, and being unaccompanied by a figure, it was involved in obscurity until the return of Thunberg from his interesting voyage, shortly after which we find it described in the *Supplementum Plantarum*, by the younger Linnæus, under the name of *Thuja Dolobrata*, which alludes to the remarkable form of the leaves.

I possess a curious work published in Japan, giving an account of the plants of that country, and illustrated by a great number of figures, among which we find one of the *Thuja Dolobrata.* Fig A. in our plate of the larger edition is an exact copy of this. The plate likewise comprises a figure of the specimen in the Banksian herbarium, for which I am indebted to the friendship of Mr. Brown, and, lastly, figures

of those contained in Kæmpfer's herbarium at the British Museum. I cannot here omit noticing the facility which my friend, Mr. Konig, afforded in taking the drawing of Kæmpfer's specimens. The *Thuja Dolobrata* would prove a most desirable acquisition to our parks and lawns, if once introduced, as it is no doubt perfectly hardy.

EXPLANATION OF TAB. 68.

a. Figure taken from the specimen in Kæmpfer's herbarium at the British Museum.

b. Figure of another specimen from Kæmpfer's herbarium, showing the underside of the leaves.

66. JUNIPERUS SQUAMATA.

CREEPING CEDAR.

Juniperus Squamata, foliis ternis adpressè imbricatis ovato-oblongis acutis acuminatisve; emarcidis persistentibus; novellis inflexo apice quasi obtusis, baccis ovatis summo umbilicatis, ramis ramulisque confertissimis teretibus, caule prostrato.

Habitat in Bhotaniæ alpibus. *W. S. Webb.*

Frutex magnus, decumbens, ramosissimus. *Rami* ampli, 3-6-pedales, reclinati, apicibus assurgentibus, cortice fusco-purpureo in laminis deciduo tecti. *Ramuli* cum novellis confertissimi, teretes, undique foliis imbricati. *Folia* terna, oblonga, adpressè imbricata, intensè viridia, lævissima, extùs convexa; *novella* plerumque obtusa apice inflexo; *adultiora* acuta v. sæpiùs acuminata; *emarcida* semper apice elongato acuminato instructa, persistentia, ad ramos, utpotè squamæ, adhærentia, undè nomen *Baccæ* numerosæ, subrotundo-ovatæ, solitariæ, rubræ, pedicello brevi squamoso suffultæ, summo umbilicatæ, paulò majores quàm in *J. communi.*

This shrub is only met with at great elevations on the Himalaya Range, in situations where the snow lies during a great part of the year.

It is called by the natives *Pudma Chunder*, and is said to be so plentiful in the district called Garawhal, that the inhabitants use it for fuel.

The wood is said to be made use of by the Hindoos in their sacrificial offerings, like the ancient cedar.

134

67. JUNIPERUS UVIFERA.

LARGE FRUITED JUNIPER.

Juniperus Uvifera, foliis ovatis obtusis appressis quadrifariam imbricatis, ramulis brevibus erectis congestis torulosis, drupis terminalibus subrotundis.

Habitat in Americâ australi ad Caput Horn dictum. *Middleton.*

Frutex decumbens, ramosissimus. *Rami* assurgentes, teretes, cortice cinereo-fusco squamoso tecti. *Ramuli* breves, erecti, confertissimi, undique foliis imbricati, torulosi, flagellas referentes. *Folia* ovata, obtusa, appressa, quadrifariam imbricata, integerrima, coriacea, glabra, lævia. *Drupæ* subrotundæ, purpureæ, magnitudine et figurâ *Uvæ minoris*, in apice ramulorum solitariæ, sessiles, læves.

This new species of Juniper was brought to this country, together with many other specimens of new plants, by Mr. Middleton, who collected them in the neighbourhood of Cape Horn.

These specimens were given to the late Mr. Forsyth, of the Royal Gardens, Kensington, who obligingly presented some of them to me.



Dacrydium cupressinum

DACRYDIUM.

FLORES AMENTACEI DIOICI.

MASCULI.

CALYX. *Amentum* oblongum, constans squamis cordato-acuminatis, staminiferis.

COROLLA nulla.

STAMINA. *Filamenta* nulla. *Antheræ* didymæ, orbiculares, transversim dehiscentes, squamæ basi adnatæ.

FŒMINEI.

CALYX.

COROLLA.

PISTILLUM.

SEMEN. *Nux* ovata, monosperma, receptaculo ampliato, firmo, basi immersa.

TAB. 69.

68. DACRYDIUM CUPRESSINUM.

NEW ZEALAND SPRUCE.

DACRYDIUM CUPRESSINUM. *Solander apud Forst. Pl. Escul.* 80. *et Flor. Inst. Aust. Prod.* 92.

The Spruce Fir of New Zealand. *Cook's Second Voyage, vol.* 1. 70. *tab. No.* 51.

Habitat in Novâ Zelandiâ.

DESCRIPTIO.

Arbor vasta, pulcherrima. *Rami* patuli, valdè ramulosi, ramuli flexuosi, dependentes; foliis junioribus, subulatis, divaricatis; adultioribus laxè imbricatis.

This tree, as I am informed by Mr. Archibald Menzies, forms large forests in the south-west parts of New Zealand. Captain Vancouver, who cut down several of these trees to refit his vessel, found the timber solid and close-grained, very much resembling the Bermudas cedar.

Foster, *De plantis Esculentis Insularum Oceani Australis, p.* 80, gives the following account of this tree. "This beautiful Genus allied to *Taxus*, whose flowers I have not seen, received the name of *Dacrydium* from the illustrious Solander. It is found in New Zealand, where Cook, from the younger branches giving out a bitter resinous juice, prepared a liquor similar to beer, called Spruce, and like that beverage, also excellent in scorbutic disorders but, drunk on an empty stomach, it produces nausea and giddiness, which however go off in a short time."

The same author in his relation of Captain Cook's Voyage, page 130, also thus speaks of it. "The Spruce of New Zealand is a very beautiful tree, and conspicuous on account of its pendant branches, which are loaded with numerous long thread-like leaves, of a vivid green. It frequently grows to the height of fifty or sixty, and even one hundred feet, and has above ten feet in girth."

Three species have been discovered in New Zealand, which are among the unpublished figures of the Right Hon. Sir Joseph Banks, one of which, called *Dacrydium taxifolium*, is mentioned in Captain Cook's first Voyage, by Hawksworth, vol. iii. p. 441, as "growing in swamps, remarkably tall and straight, thick enough to make masts for vessels of any size, and, if a judgment may be formed by the direction of its grain, very tough; this which, as has been before remarked, our carpenter thought to resemble the Pitch Pine, may probably be lightened by tapping, and it will then make the finest masts in the world: it has a leaf not unlike a yew, and bears berries in small bunches."

I received fine specimens of the branches of this tree from Governor Phillip, who procured them from New Zealand by a vessel which touched there from New South Wales, but without either flowers or fruit, so that I am unable at present to give a figure of this interesting tree.

Tab. 69 is taken from fine specimens of *D. cupressinum* collected by Mr. Menzies, who very obligingly communicated them to me, and was coloured by permission of Sir Joseph Banks, from a beautiful drawing made by Sidney Parkinson, in his celebrated voyage with Captain Cook.

EXPLANATION OF TAB. 69.

a. Male Catkin.
b. The same magnified.
c. Scale with antheræ magnified.
d. End of a branch, with fruit.
e. The same magnified.

69. DACRYDIUM TAXIFOLIUM.

YEW-LEAVED DACRYDIUM.

Dacrydium Taxifolium, foliis distichis latè linearibus acutis falcatis margine deflexis basi obliquis utrinque opacis viridibus, amentis masculis drupisque in spicam digestis.

Dacrydium taxifolium. *Solander MSS.*

Habitat in Novæ-Zelandiæ sylvis copiosè. ***Banks, Solander, Menzies, Phillip.***

DESCRIPTIO.

Arbor procera, in uliginosis proveniens. *Truncus* crassus, strictissimus. *Rami* et *ramuli* numerosi, patentissimi, flexuosi, cortice rufo obducti. *Folia* distantia, duplici serie ordinata, patula, latè linearia, acuta ut plurimùm falcata, instar eorum Taxi atque simùl colore opaco-viridi gaudentia, margine deflexa, basi obliquè inæqualia, pollicem longa, lineam aut nunc rariùs ultrà lata, petiolo brevissimo exili stipitata. *Amenta mascula* plura (10-20), distantia, sessilia, patula, in spicas laterales nunc terminales digesta, semuncialia, oblonga, cylindracea, patula, crassitie bilinearia. *Drupæ* plures (4-7), spicatæ, subsessiles, ovales, mucrone brevi terminatæ.

I am in possession of several specimens of this tree, which, however, are without either catkins or fruit. These are only known to me from a drawing taken during the stay of Sir Joseph Banks and Dr. Solander in New Zealand, in the first voyage of Captain Cook.

70. DACRYDIUM DISTICHUM.

Dacrydium Distichum, foliis distichis linearibus mucronulatis glauco-viridibus patulis margine planis basi æqualibus.

Podocarpus taxifolia. *Kunth in Nov. Gen. et Sp. Plant. II. p. 2. t. 97?*

Habitat in Peruviæ Andibus. *Pavon.*

DESCRIPTIO.

Arbor............... *Rami* teretes, de lapsu foliorum tuberculosi, cortice gryseo vestiti. *Folia* sparsa, disticha, linearia, mucronulata, recta, patula, glauco-viridia, subtùs pallidiora, vix pollicem longa, semilineam lata, margine plana, basi æqualia, brevissimè stipitata, ad medium nervo validiori lineata. *Cætera* desiderantur.

Whether this species belongs to the genus *Dacrydium*, and whether it is really the same with the *Podocarpus taxifolia* of M. Kunth, our specimens do not allow me to decide, they having neither flower nor fruit.

71. PODOCARPUS SALIGNA.

WILLOW-LEAVED PODOCARPUS.

Podocarpus Saligna, foliis elongatis lineari-lanceolatis acutis glabris brevissimè petiolatis, drupis ovalibus pedunculatis axillaribus solitariis lævibus.

Habitat in Chili. *Pavon.*

DESCRIPTIO.

Arbor............*Rami* numerosi, teretes, glabri, cortice fusco lævi tecti. *Folia* latè linearia, acuta, plana, coriacea, lævia, margine integerrima, utrinque glabra, lucidula, alterna, nunc opposita, 3-uncialia, sesquilineam lata, ad medium nervo lato valido instructa, basi petiolo brevissimo suffulta. *Drupæ* ovales, læves, pedicello semi-unciali cylindraceo stipitatæ. *Spatha* tubulosa, lævis, limbo obliquo et integro.

This and the two following species are clearly referable to *Podocarpus*; but I possess no particulars respecting their habits or uses. They are very distinct species, and afford one of the many examples of coincidence between the vegetation of Chile with that of New Holland and the southern extremity of Africa.

72. PODOCARPUS OLEIFOLIA.

OLIVE-LEAVED PODOCARPUS.

Podocarpus Oleifolia, foliis confertis, lanceolatis acutis glabris margine deflexis, amentis masculis solitariis sessilibus.

Habitat in Chili. *Pavon.*

DESCRIPTIO.

Arbor frondosa. *Rami* conferti, foliosi, cortice luteo-fusco lævissimo vestiti. *Folia* lanceolata, acuta, integerrima, unam v. sesquipollicem longa, 2 v. 3 lineas lata, coriacea, utrinque glabra, uninervia, suprà ad nervum lineâ depressâ exarata, basi attenuata, margine parùm reflexa. *Amenta* mascula, solitaria, sessilia, cylindracea, uncialia, basi squamis pluribus imbricatis subrotundis munita: *antheris* brevissimis, cuneatis, subtùs duplici rimâ dehiscentibus, apice auctis appendice semi-orbiculari membranaceâ integerrimâ undulatâ. *Drupæ* ovales, solitariæ, lævissimæ, cernuæ. *Pedunculi* filiformes, glabri, semunciales. *Spatha* campanulata, è medio pedunculi ortum ducens, bivalvis, limbo bilobo.

73. PODOCARPUS GLOMERATA.

PODOCARPUS GLOMERATA, foliis lineari-lanceolatis acutissimis glabris, amentis masculis glomeratis, pedunculis oppositis.

Habitat in Chili. *Pavon.*

DESCRIPTIO.

Arbor .... *Rami* numerosi, teretes, foliosi, cortice luteo-fusco lævi tecti. *Folia* lineari-lanceolata, acutissima, integerrima, plana, uninervia, alterna, conferta, basi subattenuata, utrinque glabra, lucida pollicaria v. sesquipollicaria, unam v. sequi-lineam lata. *Amenta mascula* brevia, cylindracea, semuncialia, semilineam crassa, plura (5-6) in glomerulis oppositis, pedunculo filiformi glabro suffulta, basi squamis pluribus imbricatis munita. *Antheræ* parvæ, subrotundæ, angulatæ, apice appendice minutâ, circumscriptione rotundatâ, membranaceâ, laceratâ auctæ.

76. PODOCARPUS PUNGENS.

POINTED-LEAVED PODOCARPUS.

Podocarpus Pungens, foliis sparsis linearibus elongatis mucronatis margine incrassatis, drupis globosis.

Habitat in Novâ-Hollandiâ. *G. Caley*.

DESCRIPTIO.

Arbor .... *Rami* numerosi, teretes, recti, cortice cinereo lævi obducti, basi percurrente foliorum lineati. *Folia* sparsa, linearia, coriacea, mucronata, pungentia, glabra, suprà viridia, subtùs pallida, utrinque costâ validâ, margine incrassata, basi angustata, sesqui-v. bipollicaria, vix lineam lata. *Drupa* globosa, solitaria, axillaris, magnitudine *Pisi*, erecta, pedicello tereti lævi ultra-semiunciali sustentata. *Spatha* campanulata, limbo bilabiata, basi squamis duabus munita.

PINUS MENZIESII.

WARTED-BRANCHED FIR.

Pinus Menziesii, foliis acutis planis subtùs argenteis undique versis, strobilis cylindraceis: squamis scariosis margine erosis.
Pinus Menziesii. *Douglas MSS.*

Habitat in Plagâ occidentali Americæ borealis. *Douglas.*

DESCRIPTIO.

Rami et *ramuli* tuberculati. *Folia* undique versa, baseos contortione resupinata! linearia, mucronulata, incurva, subtùs argentea, tuberculo elevato articulata, semipollicaria. *Strobili* cylindracei, tripollicares: *squamis* obtusis, laxis, cartilagineo-scariosis, margine erosis. *Bracteolæ* lanceolatæ, acutæ, inclusæ.

Obs. Species ut videtur Peucem et Abietem conjunxit, facie Peucis, sed strobili omninò Abietis!

This is one of those remarkable forms which connect the different groups together, possessing the habit and leaves of the silver firs, with the cones of the spruces, and affording one among many other examples that might be adduced of the necessity of retaining the genus entire, as has been done by the illustrious Swede.

The species of this genus are peculiar to the northern hemisphere; and on the North American continent they seem to abound most between the 35th and 19th degrees of latitude. They are found to become more varied and remarkable in structure as we approach the Pacific, particularly on the chain of the northern Andes, where the climate appears singularly favourable to their developement. *Pinus occidentalis* is found on the mountains of St. Domingo, and we have seen the cone of a nearly related species from the interior of Honduras, so that it is probable the most southern range of the pine tribe is between the 17th and 18th degrees of north latitude.

TAB. 47 & 78.

43. PINUS DOUGLASII.

TRIDENT-BRACTED FIR.

PINUS DOUGLASII, foliis planis obtusis integris pectinatis subtùs argenteis, strobilis ovato-oblongis, bracteolis elongatis linearibus tricuspidatis.
Pinus Douglasii. *Sabine MSS.*
P. taxifolia. *Lamb. Monog. ed.* 1. *t.* 33.

Habitat in Plagâ occidentali Americæ borealis. *Menzies, Douglas.*

DESCRIPTIO.

Arbor maxima, cortice crassissimo, fusco-cinereo, resinâ odore balsameo. *Folia* pectinato-patula, angustè linearia, margine apiceque obtusa, integerrima, plana, suprà lætè viridia, lineâ depressâ medio exarata, subtùs argentea, pollicaria. *Amenta* mascula, brevia, densa, obtusa, vix semuncialia. *Bracteæ* scariosæ, concavæ, obtusissimæ, margine ciliato-laceræ. *Antheræ* obcordatæ, brevissimæ, biloculares: *cristâ* brevissimâ, obtusâ, crassâ, tuberculiformi. *Strobili* in apice ramulorum terminales, solitarii, ovato-oblongi, spadicei, basi bracteis plurimis, linearibus, acuminatis muniti: *squamis* sub-orbiculatis concavis, coriaceis, integerrimis, lævibus. *Bracteolæ* lineares tricuspidatæ castilagineo-membranaceæ, squamis duplò longiores: *dentibus* acuminatis; *intermedio* longissimo. *Semina* ovoidea, testâ crustaceâ: *alâ* ellipticâ, obtusâ, badiâ, margine exteriore leviter convexo.

The materials whence my former account of this species was derived, were so imperfect, and the name I had applied being by no means a happy one; and the more especially as the Silver Fir has been called *Abies taxifolia*, I gladly adopt the name of *P. Douglasii,* in honour of the indefatigable botanist, to whom I am indebted for the specimens from which I have been enabled to complete my description and plates of the species. It is undoubtedly one of the most distinct, as well as the most remarkable of the group to which it belongs. It was first observed by my friend Mr. Menzies, in the voyage of Captain Vancouver, but the specimens being without the cones, it was not until Mr. Douglas had supplied us with these, that I became acquainted with its essential characters. I had formerly placed this species next to *P. canadensis,* from which it is now seen to be widely different.

EXPLANATION OF TAB. 47 & 78.

a. Male Catkin.
b. Bractea magnified.
c. Anthera ditto.
d, d. Leaves.
f. Cone.
g. Scale of ditto.
h. Seed.

PINUS DUMOSA.

It is said to be found only at great elevations. In Nepal it is called *Silloo-hatarhee,* and in Bhotan *Tongshing.*

The following extract respecting this Fir is from Captain Webb's letters:—

"This Pine was found in the southern confines of Bhotan, where it is called *Tongshing.* It delights in elevated positions, throwing out branches at fifteen or twenty feet. The leaves are extremely deciduous, a trifling shake being sufficient to detach them. The wood is not used, being likely to warp."

EXPLANATION OF TAB. 46.

a. Leaf magnified.
b. Cone.
c. Scale of a Cone.
d. Bractea.
e. Seed.



Pinus Gerardiana

Hall del. E.S.W.

TAB. 79.

PINUS GERARDIANA.

SHORT-LEAVED NEPAL PINE.

PINUS GERARDIANA, foliis ternis abbreviatis, vaginis deciduis, strobilis ovato-oblongis: squamarum apicibus crassis obtusis recurvatis.
Pinus Gerardiana. *Wallich. MSS.*

Habitat in summis Emodorum montibus. *D. Gerard.*

DESCRIPTIO.

Arbor magna. *Ramuli* cortice spadiceo, lævi. *Folia* terna, abbreviata, mucronulata, recta, glauco-viridia, suprà bicanaliculata, subtùs convexa, jugo intermedio marginibusque obsoletè crenulatis; bipollicaria v. paullò longiora. *Vaginæ* laxæ, deciduæ, squamis lanceolatis, scariosis, nitidis, spadiceis. *Squamæ stipulares* ovatæ, acutæ, cartilagineæ, fulvæ, margine integerrimæ, læves. *Strobili* ovato-oblongæ, fuscescentes, longitudine 9-10-unciales, circumferentiâ prope basin 17-pollicares: *squamis* crassis, latissimis, cuneatis, suberosis: *apicibus* elevatis, crassis, obtusis, dilatatis, recurvatis. *Semina* oblonga, basi subteretia, fusca: ala lata, dolabriformis, sordidè fusca, nitida.

IN the form and structure of its cones, this species closely resembles *P. longifolia*, but they are double the size, and the leaves are as remarkable for their shortness as those of the former are for their length; and they are moreover furnished with a deciduous sheath, as in the Strobus tribe. It has been named by Dr. Wallich in honour of its discoverer, Capt. P. Gerard, of the Bengal Native infantry, author of Observations on the Climate of Subathu and Kotgerh, printed in the 15th volume of the Asiatic Researches.

I am indebted to my friend Dr. Wallich for the specimen from which the figure was taken. I have also received seeds of this Pine from the Countess Amherst, which were procured by an officer at Kinour, situate on the further side of the Himalaya Mountains, on the Chinese Tartary side.

EXPLANATION OF TAB. 79.

a.	Leaves.	d.	Cone.
b, b.	Do. magnified.	e.	Seed.
c.	Sheath of leaves.	f.	Do. from Lady Amherst.

TAB. 80.

PINUS SABINIANA.

GREAT PRICKLY-CONED PINE.

Pinus Sabiniana, foliis ternis prælongis, strobilis ovatis echinatis maximis: squamarum apicibus elongato-subulatis incurvatis spinosis.
Pinus Sabiniana. *Douglas MSS.*

Habitat in Novæ Albaniæ Andibus in Plagâ occidentali Americæ borealis. *Douglas.*

DESCRIPTIO.

Arbor mediocris, 40—120 pedes alta. *Ramuli* cortice luteo-fuscescenti, lævi. *Folia* terna, pedalia, lenta, subflexuosa, jucundissimè viridia, suprà bicanaliculata, jugo intermedio elevato marginibusque obsoletè crenulatis, subtùs convexa, lævia; hyeme flaccida et pendula. *Vaginæ* pollicares, et sæpè paullò ultrà, cinereo-fuscæ, nitidæ, ore nunc subintegro. *Squamæ stipulares* lanceolatæ, acuminatæ, ferrugineæ, margine fimbriato-laceræ. *Strobili* aggregati (3—9) ovati, echinati, spadicei, cernui, longitudine 9—11-unciales, circumferentiâ prope basin 16—19-pollicares. *Squamis* spirali modo eleganter dispositis, cuneatis, osseis, latissimis: *apicibus* elongato-subulatis, compresso-tetragonis, uncinato-incurvatis, spinosis, validissimis. *Semina* oblonga, ossea, fusca: *âlâ* brevi, rotundatâ, fuscâ, nitidâ.

This remarkable species of Pine, which is a native of the Cordilleras of the Andes of New Albion, is one of the many discoveries of our indefatigable friend Mr. Douglas, who was the first to open to us the vegetable treasures of those little known regions of the western hemisphere. Mr. Douglas has named the species in compliment to his early friend and patron Mr. Sabine, the late zealous Secretary of the Horticultural Society, to whom I am indebted for the following account of the tree by Mr. Douglas, in whose Herbarium there are several other hitherto unpublished species of this genus, some of which are equally remarkable with the one above described, for the peculiarities to be observed in their habit and structure. In order to secure to Mr. Douglas the credit of these interesting discoveries, I have subjoined descriptions of them.



Pinus Sabiniana.





Pinus Sabiniana.

PINUS SABINIANA.

Mr. Douglas's account of the tree is as follows:

"The tree attains to but a small size, as compared with those species of the genus which inhabit the northern and western parts of North America. The trees are of a tapering form, straight, and of regular growth, forty to one hundred and twenty feet in height, two to twelve feet in circumference, clothed with branches to the ground when standing far apart or solitary. Some few reach one hundred and forty feet in length, but those are not of greater circumference.

"The largest and most handsome trees inhabit the aqueous vegetable deposits on the western flanks of the Cordilleras of New Albion at a great elevation above the level of the sea, 1600 feet below the verge of perpetual snow, in the parallel of 40° north. On the less elevated mountains near the coast, where the temperature is higher, but more uniform, in the parallel of 31° north, in decomposed granite, schist or gravelly soils, the trees are smaller and few, inhabiting the summits of the mountains only. The wood is white, soft; even-grained, and perhaps not very durable. The leaves are in threes, very rarely in fours, eleven to fourteen inches long, sharp, round, and smooth on the outside, angular on the inside, serrated, more widely and conspicuously so towards the points, erect, flaccid, and drooping during winter. Sheath 1–5 inch long, light brown, chaffy and torn at the top. Stipule lanceolate, rigid. Male and female flowers erect. Flowers in February and March. Cones ovate, recurved, pressing on the shoots for support, three to nine in number surrounding the same stem, remaining on the tree for a series of years, nine to eleven inches long, sixteen to eighteen inches round; some however are longer. Scales spathulate, 2.25 inches long, having a very strong, sharp, incurved point, which near the base exceeds the length of the scale, with abundance of pellucid resin. Seed somewhat oblong, tapering to the base, flattish on the inside, an inch long, and nearly half an inch broad. Shell thick, hard, brown; wing short, half the length of the seed, stiff, nearly encompassing the seed. Kernal pleasant. Cotyledons from 7 to 12 in number.

"The first year the cone measures from six to eight inches round, and is of a more rounded form than when perfect in the November of the following year. The colour of the young cone is bright green."

I am obliged to the liberality of the council of the Horticultural Society for the opportunity of giving a figure of this remarkable species.

EXPLANATION OF TAB. 80.

a. Leaves.
b. Do. magnified.
c. Bractea.
d. Cone.
e, g. Scale of Do.
f. Seed.

PINUS NOBILIS.

LARGE-BRACTED FIR.

PINUS NOBILIS, foliis secundis falcatis brevibus acutis sùbtùs argenteis, strobilis cylindraceis, bracteolis elongatis spathulatis erosis retrorsum imbricatis.

Pinus nobilis. *Douglas MSS.*

Habitat in Plagâ occidentali Americæ borealis. *Douglas.*

DESCRIPTIO.

Arbor magna, cortice cinnamomeo. *Folia* conferta, secunda, linearia, falcata, plerumque acuta, compresso-trigona, suprà plana, lineâ depressâ exarata, subtùs argentea, vix pollicaria. *Strobili* solitarii, laterales, cylindracei, basi apice, crassi, spadicei rotundata cuneato-latissimis 6-7-unciales, circumferentiâ 8-9-pollicares: *squamis* lamelliformibus, stipitatis copiosè minutèque pubescentibus, margine integerrimis incurvatis. *Bracteolæ* longè exsertis spathulatis, retrorsùm adpressis, imbricatis, laminâ dilatatâ membranaceâ, scissâ acumine elongato subulato rigido. *Semina* oblonga, testâ coriaceâ: *alâ* latâ dolabriformi, tenuissimè membranaceâ, pallidâ.

Obs. *P. Fraseri* proxima, sed strobili 5-plò majores.





NOTES ON THE MORETON BAY PINE.

BY

ALLAN CUNNINGHAM, ESQ. F.L.S.

ARAUCARIA CUNNINGHAMII. *Aiton. MSS. G. Don. in Loud. Hort. Brit.*

THIS Pine was first seen by the late Sir Joseph Banks and Dr. Solander, on the discovery of New South Wales by the immortal Cook, in the year 1770.

From 1774, when Norfolk Island was discovered in a subsequent voyage of that celebrated circumnavigator, and its Pine examined, on to the period of the voyage of Captain Finders, to which was attached that eminent botanist Mr. Brown, and down even to within a date only eight years ago, this noble tree was considered the same with that of Norfolk Island; although in the voyages of Captain King, whom I accompanied throughout his surveys, I had some reason to doubt their identity, from what I observed of its habit. But it was not until my visit to the shores of Moreton Bay with the late Mr. Oxley in 1824, that I had a favourable opportunity afforded me of satisfying myself, on the banks of the Brisbane, a river then recently discovered, falling into the Bay, that it was a very distinct species, not simply in its habit of growth, which is very remarkable, but in the character of its leaves.

On its being received into the royal gardens at Kew afterwards, it received the above name, which it appears has been since generally adopted by all who can boast of a living plant in their collections.

On the coast of New South Wales, it has a range of nine hundred miles between the parallel of 14° and 29½°, but in no part, whether on the islands in the offing, on many of which it is the only timber, or on the main shore, it has been remarked of large size; rather appearing of stunted irregular growth, and frequently broken down by the force of the prevalent winds.

On the alluvial brushy banks, however, of the Brisbane river, in 27° 30′, where it is perfectly sheltered from every blast, it rises to the height of from one hundred to one hundred and thirty feet, with a girth of from fourteen to sixteen, and even more feet; and such specimens are frequently to

be met with, having a clear, smooth, cylindrical barrel, eighty feet in length from the ground to the lowest branches.

In my several geographical excursions in the truly interesting country lying to the westward of Moreton Bay, I met with this Pine at some distance from the banks of the Brisbane river, as also on the hills on the western side of the dividing range, in lat. 28°, at a distance from the coast of about eighty miles; beyond which, however, in any inland or western direction, it certainly does not exist. Its maximum, therefore, is evidently on the immediate coast within the influence of the sea air, which, however, is not so essential to its existence, as it appears to be of some of the plants I had discovered during Captain King's voyage, particularly some splendid species of Grevillea, which in consequence, were found exceedingly difficult to cultivate at Kew, where they ultimately died, and were lost to Europe.

This Pine bears young cones in the month of September. Its wood is a pale yellowish deal, and is commonly used in house carpentry, for making common furniture, and in boat-building at Brisbane town. In the green state, its spar has been formed into masts for vessels of two hundred tons, which are said to stand so long as the sap continues in them; but after becoming dry, they are not to be depended on.

OBSERVATIONS

ON THE

CONIFEROUS TREES OF NEW ZEALAND.

BY

GEORGE BENNETT, ESQ. F.L.S. M.R.C.S. &c. &c.

My dear Sir,

At your request I have written some observations on the Coniferous trees of New Zealand, made during a recent visit to that interesting country. Of the *Coniferæ* I collected specimens of eight species, called by the natives, Kowri, Remu, Tanakaa, Mai, Kaikeatea, Kawaka, Totara, and Miro; these trees are, from their stately, erect, and elegant growth, the most conspicuous of the timber trees which adorn the New Zealand forests. The timber produced from these trees varies in quality: the Kowri is generally preferred for the yards and masts of ships, as well as for other purposes, the wood being fine grained, and possessed of much flexibility.

THE KOWRI.

This magnificent tree which ornaments the New Zealand forests, is the *Dammara australis* of Lambert, and is called Kowri by the natives of New Zealand, which name probably was given on account of the great diameter it attains. It grows very erect, and attains the height of from eighty to ninety feet, and in diameter is considered the largest tree in New Zealand. It occasionally attains twenty-four feet in circumference, and I have seen several cut down measuring from sixteen to twenty feet. The timber is of an excellent quality, close grained, durable, and valuable for a variety of purposes, either in plank or spar: as yards and masts for shipping, they have been found, by repeated trials, superior to all others, both in their flexibility as well as durability. The wood is of a white colour. The leaves of this pine, when young, are alternate, but in form lanceolate, which change, as the tree increases in growth, to an elliptical or oblong form.

This tree yields a large quantity of resin of a white and amber colour, very transparent, burning with a bright flame, and having a very agreeable smell. It exudes spontaneously, and concretes on the trunk, but in much larger quantities on an incision being made in the tree, and left for a night; on the following morning a large quantity is usually found to have exuded, and still continues to exude for a long time afterwards, and this tree yields the largest quantity of resin of all the New Zealand resiniferous trees. It resembles the resin named Dammar in the East Indies, and is, indeed, produced from a tree of the same genus, and might, consequently, be employed for similar purposes for which that resin is used in India—as a pitch for ships, varnish, &c. and might form an article of commerce from New Zealand to the colonies of New South Wales, Van Dieman's Land, and England; and from the quantity I have seen obtained from one tree, it may be collected abundantly in a short period of time. The natives name the resin Vare, or the Wai, (water,) of the tree.

The pigment or soot, (Ngarahu,) which is the colouring substance used by them in the tatuing operation, is usually prepared from this species of pine, from its possessing more resin than any of the others. On inquiring of a New Zealander why they did not use any other kind of tree, and why this particular pine was preferred, his reply was, that the pines contained more Wai, or Resin; and the Kowri was preferred because it contained more than any other species. When resins burn they yield a quantity of smoke, which deposits a quantity of soot; this was observed by the savages, and adopted as an opportunity of acquiring a pigment for the adornment of their persons. Among savages we almost invariably find an intimate knowledge to exist of the various uses to which trees, plants, &c. are capable of application. The natives of New Zealand collect the resin of the Kowri tree, and use it as a masticatory. The engraving of a portion of this splendid pine in your valuable work on the *Coniferæ* is correct, and beautifully executed.

REMU.—*(Dacrydium cupressinum.)*

This species of *Dacrydium* is called Remu by the natives of New Zealand; I have seen it attaining the elevation of eighty or ninety feet, but seldom exceeding a circumference of fifteen feet. The timber is hard, of excellent quality either in plank or spar, and is considered the hardest timber of all the New Zealand *Coniferæ;* this species is not found so abundant as the other pines, having its habitat only in particular districts. The wood in colour is an intermixture of white and red; no gum resin exudes from it. The fruit is eaten by the natives, and was described by them as a small red berry, containing a black seed. This species of Dacrydium is the one mentioned by Captain Cook as the Spruce Fir of New Zealand.

CONIFEROUS TREES OF NEW ZEALAND.

TANAKAA, TAWAI, OR TOATOA.—(*Phyllocladus sp.*)

This tree, the Tánákáá, Tawai, or Toatoa of the natives, is an unpublished species of *Phyllocladus:* it attains the height of sixty to seventy feet, but seldom exceeds fourteen or fifteen feet in circumference. The timber is hard and heavy, of good quality either in plank or spar, and of a white colour, but not equal in durability to the Kowri, and its weight renders it less valuable for spars; it sinks in water, and a gum resin exudes from it, but in very small quantity. The bark of this tree is used by the natives of New Zealand for dyeing a red or black colour; the mode of preparation is as follows: the bark is pounded, and then placed into a vessel of cold water, into which hot stones are placed until the water boils.* After the bark has been boiled for some hours, the liquid becomes of a dark red colour: it is then left to cool, the decoction is strained, and ready for use. The flax (Muka) intended to be dyed is then put into this liquid; and after remaining some time, is, when taken out, found of a red colour: it is afterwards placed in the sun to dry. This red colour is not indelible, but will stand frequent washings before it comes out. When the flax is to be dyed a black colour, after having undergone the before-mentioned process, it is placed in mud,† (usually from marshes, &c.) and remains in it for the space of twelve hours, after which it is taken out, dried, and is found of a shining black colour. The bark of this tree is generally used when in a recent state, but its virtues also remain when dried. The beautiful black colour of the flax used in the manufacture of some kinds of the New Zealand mats is procured by the above-mentioned process.

MAI, OR MATAI.—(*Podocarpus sp.*)

This tree, called Mai or Matai, by the natives, is an unpublished species of *Podocarpus.* It attains the height of from eighty to ninety feet, and a circumference of from ten to twelve feet; it is scarce in the vicinity of the sea, but is found abundant inland. The wood is of excellent quality, and of a red colour, resembling Cedar.

KAIKEATEA.—(*Probably a species of Dacrydium.*)

From the specimens collected, this coniferous tree is supposed to be a species of *Dacrydium*, and is called Kaikeatea by the natives. It attains the height of from one hundred and twenty to one hundred and thirty feet, being the loftiest timber tree in New Zealand; and is in circumference from

* This is the native mode of heating water, as they have no vessels which can be placed on the fire.

† Salts of iron very probably abounds in the mud.

twelve to sixteen feet. The quality of the timber is not good for spars, on account of its softness and liability of splintering; nor for plank, on account of its warping, and deficiency of durability. A gum resin of a reddish colour exudes from this tree, which is used as a masticatory by the natives, similar to the Kowri. This tree bears a small red berry named Koroe by the natives, having one hard seed; the berries have a sweet taste, and are eaten by them. The common canoes are made from this timber, its great length enabling the canoes to be constructed of a large size for carrying provisions, &c.

THE KAWAKA AND MIRO

Were collected neither in fruit or flower. The former is supposed to be a species of *Dacrydium*, the latter a *Podocarpus*.

The Kawaka attains the height of from sixty to seventy feet, and from eight to ten feet in circumference. The timber is of a red colour, and of an excellent quality for either plank or spar. No gum resin is produced by this tree. The natives informed me, that it derived the name Kawaka from the branches growing out regularly on each side of the tree.

The Miro attains the height of from thirty to forty feet, and from six to eight in circumference; the wood is hard, and of a reddish colour. It is not used by the natives for any particular purpose. A gum-resin exudes from it, of a dark reddish colour; it is not, however, chewed by the natives, like the other gum-resins, on account of its having a bitter taste. The tree is abundant in hilly situations, and grows in good soil.

TOTARA.—*(Podocarpus sp.)*

This is an unpublished species of *Podocarpus*, called Totara by the natives. It attains the height of eighty or ninety, and a circumference of fifteen or twenty feet; and is considered the next in diameter to the Kowri. The timber produced from it is of a reddish colour, becoming of a darker colour from age and exposure; the wood is of excellent quality both in plank and spar, and is held in high estimation among the natives, particularly for the construction of their canoes, its lightness and durability causing it to be highly valued and preferred before all others. I did not observe any gum-resin exude from the tree, but the specimens of the tree I collected, when dried had a very fragrant smell, which was not perceived in them when recently gathered. I observed this tree abundant on the banks of the river Kowa-kowa, as well as on the lofty hills in the vicinity. The value placed on this tree by the natives is sometimes the occasion of quarrels, terminating in bloodshed, if it is cut down by any excepting the party by whom it is claimed; for which reason, and that it might be known as belonging to certain individuals,

a mark is placed on the tree, and it is then reserved until it has attained a sufficient magnitude for use; so that it is not unusual for the trees to descend from father to son.

As the *Coniferæ* of New Zealand are but little known, the foregoing brief remarks respecting size, quality of timber, &c. may probably be considered interesting. Being on the eve of taking my departure for Sydney and New Zealand, I am in expectation of being able to collect more information respecting the coniferous and other timber trees of the latter country, which I shall take the earliest opportunity of communicating to you.

I remain, my dear Sir,

Your's, very truly,

GEORGE BENNETT.

London, February 6th, 1832.

BOTANICAL CHARACTERS OF SEVERAL SPECIES OF CONIFEROUS TREES OF NEW ZEALAND.

1. Phyllocladus trichomanoides, frondibus pinnatis: foliolis cuneatis inciso-lobatis: lobis truncatis dentatis.

   Habitat in Novâ-Zelandiâ. ad ripas fluminis Thames. *D. Bennett.* Tanakaa *indigenis.*

2. Podocarpus? ferruginea, foliis pectinatis lineari-lanceolatis acuminatis falcatis.

   Habitat in Novâ Zelandiâ. *Phillip, Bennett.* Miro *indigenis.*

   Obs. A nobis cum Dacrydio taxifolio olim confusa.

3. Podocarpus? Totara, foliis undique versis lineari-lanceolatis mucronatis subtùs glaucis.

   Dacrydium taxifolium. *Solander MSS.*

   Habitat in Novâ-Zelandiâ. *D. Bennett.* Totara *indigenis.*

4. Dacrydium? plumosum, foliis pectinatis linearibus mucronato-aristatis; ramuli adultioris subsetaceis undique confertis.

   Habitat in Novâ-Zelandiâ. *D. Bennett.* Kawaka *indigenis.*

5. **Dacrydium excelsum**, foliis laxè imbricatis subulatis compresso-tetragonis mucronatis glaucis: angulis depressis.

Habitat in Novâ-Zelandiâ. *D. Bennett.* Kaikeatea *indigenis.*

Flores et fructus haud vidi, sed exhabitu D. cupressino proxima videtur species, quod differt foliis omninò muticis, angulis elevatis.

SOME ACCOUNT

OF THE

MEDICINAL AND OTHER USES OF VARIOUS SUBSTANCES

PREPARED FROM

TREES OF THE GENUS PINUS,

BY

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SOME ACCOUNT

OF THE

MEDICINAL AND OTHER USES OF VARIOUS SUBSTANCES

PREPARED FROM

TREES OF THE GENUS PINUS.

MOST species of Pinus may be made to yield (and many of them produce spontaneously) a remarkable resinous juice, usually called *Turpentine*. This appellation more properly belongs to the product of a different genus, called by Linnæus *Pistachia*, which contains the tree *Terebinthus** of the ancients. The juice of Pines, however, like that of the Turpentine trees, has an austere, astringent taste, singular viscosity and transparency, ready inflammability, and a disposition to become more or less concrete. In distillation with water, it yields a highly penetrating essential oil, and the liquor is found to be impregnated with an acid, a brittle resinous matter remaining behind. Digestion with rectified spirit of wine completely dissolves all the resinous part, along with which some portion of the insipid gum, or mucilage, is also taken up. If this solution be filtered, and diluted largely with water, it becomes turbid, and throws off the greatest part of the oil, the gummy substance being retained. If the solution be subjected to distillation, the spirit brings over with it some of the lighter oil, so as to be sensibly impregnated with its terebinthinate odour, and it leaves behind an extract differing from the resin separated by water, in having an admixture of mucilage.

The native juice becomes miscible with water, by the mediation of the yolk or the white of an egg, but more elegantly by that of vegetable

* The Τερμινθος of Theophrastus, (lib. 3. c. 3,) and Dioscorides, (lib. 1. cap. 76,) from which the word *Terebinthus* seems to have been derived. *Pistachia Terebinthus* yields the resinous juice called in the shops *Cyprus* and *Chio* Turpentine, the superiority of which to all the products of the Pine tribe was well known to, and described by, most of the ancient writers on the *Materia Medica*, (See *Diosc. loco supra citato.*)

Genuine turpentine is almost colourless, and emits a peculiar odour, much more agreeable than that of the common turpentines of the shops.

mucilage, and forms a milky liquor. Exposed to the immediate action of fire, the roots and other hard parts of the tree produce a thick, black, empyreumatic fluid, which, containing a proportion of saline and other matter mixed with the resinous and the oily, proves soluble in aqueous liquors, and, according to its several modifications, constitutes the varieties of *Tar* and *Pitch*.

The resinous *residua* of the several processes to which the matter extracted from Pines may be subjected, constitute the varieties of *Rosin*, *Colophony*, &c. There are also other products, both native and artificial, much employed in medicine and the arts, and which have correspondent denominations, to be specified in their proper places.

The terms commonly attached to these substances are, in general, extremely vague, ambiguous, and inexpressive. Those employed in ancient authors are not to be excepted from the application of this remark; they have occasioned great difference of opinion among commentators, and, in some instances, they remain to this day, undefined; but, on the whole, they were used with more precision perhaps than is observable either in the popular discourse, or in the regular *pharmacopœiæ*, of modern times.

In the following pages which are intended to describe the several substances and processes in detail, we shall endeavour to dissipate the confusion so far as we are able, by substituting appropriate appellations for those which are either ambiguous or likely to lead to error, and by arranging immediately under every head such synonyms as may be adduced without undue latitude of conjecture.

As so many trees of this genus yield the same substances, and as in different countries different trees have been had recourse to, authors will be found to vary very much in their references to the species of *Pinus*, from which these substances are respectively procured. The processes themselves are also somewhat different among different nations. We shall content ourselves in this treatise with pointing out those species which have been generally considered as most proper for the several purposes, and, in regard to the processes, confine ourselves to those which appear best suited to their respective objects.

Medicinal Properties of Terebinthinate Substances in general.

Terebinthinate substances, when taken internally, seem to warm the *viscera*, raise the pulse, and impart additional excitement to the whole vascular system; applied externally, they increase the tone of the part, counteract indolence of action, and deterge, as it were, ill-conditioned ulcers. *Internal* ulcerations indeed, especially in the urinary passages, as well as laxities of the seminal and uterine vessels, are supposed to be diminished by the exhibition of preparations of this nature. They cer-

tainly seem to act in a peculiar manner on the urinary organs, impregnating the water with a violet smell, even when applied externally.* Most of them produce a laxative effect on the bowels, when given in a certain dose.

There also appears to be a sort of styptic property in some preparations of turpentine, on which account recourse is frequently had to these in such cases of obstinate hæmorrhage as are not attended by strong arterial action.

Pulmonary complaints, as obstinate coughs and asthmatic affections, have been said to give way to medicines of this class: yet, in modern practice, recourse is rarely had to them in such cases, and their exhibition is even considered as hazardous.

The ancients were accustomed to medicate some of their wines with resinous substances, the astringent flavour of which was agreeable also to their palates.† These wines were supposed to assist digestion, restrain ulcerous and other morbid discharges, provoke urine, and strengthen the bowels; but Dioscorides informs us, that they were known to produce vertigo, pain of the head, and many mischiefs not incident to the same quantity of vinous liquor free from such admixtures.

The particular preparations of turpentine most employed in the treatment of the several diseases alluded to will be noticed under the correspondent heads, which we have arranged in the botanical order of the species, and of which, therefore, the first is

SCOTCH FIR.

1. LIQUID RESIN.

(Resina liquida pinea.)
Terebinthina vulgaris. Dale's *Pharm.* (Ed. 3.) p. 278. Linn. *Mat. Med.* p. 153. *Pharm. Lond.*
Common Turpentine.

The *Common Turpentine* is more coarse and dense than any other sort, and has an opake light brown colour. Its consistence may be compared to that of honey. The taste is very acrid, hot, and disagreeable, and the smell much less pleasant than either the Venice or the Strasburg turpentine. It is this kind, which (as its name implies) is most commonly used on all occasions when a terebinthinate juice is wanted, either in medicine or in

* Kaauw *de Persp.* n. 430.

† See Dioscorides, lib. 5. c. 35, 36, 37, 38, 39, where he describes the Οινος Ρητινιτης, Στροβιλιτης, Κεδρινος, Πισσιτης, &c.

the arts, and a greater variety of preparations owe their origin to it than to the product of any other species of *Pinus*.

The artificial extraction of the resinous juice of the Pine seems to have been practised by the ancients in a manner very similar to that which obtains at present. Theophrastus* gives a particular account of the several trees employed for this purpose in his time, of the proper season of the year for commencing the process, and of the several variations in the quality of the juice; and, though commentators have not been able to refer all the trees described by this venerable author to their proper places in the Linnæan *Species Plantarum*, it is sufficiently evident that three or four kinds of turpentine were in use among the ancient physicians, which corresponded, in their properties, with those found in the shops of the moderns.†

The mode of extracting the liquid resin of the Pine, however, is not mentioned by Theophrastus, or by any other writer of antiquity sufficiently in detail to deserve insertion here, and we shall therefore transcribe the account given by Duhamel (in his "*Traite des Arbres*,") who is more circumstantial than any other author, and who, though not much more precise than the older naturalists in defining the particular species of trees most eligible for the operations, seems to have acquired very accurate information respecting the operations themselves, and several interesting circumstances connected with them.

It is well known that all Pines, even of the same species, do not yield an equal quantity of resin. Some produce three pints in one summer, and others not half a gallon the whole time they last. This difference does not seem to depend on the size or on the age of the tree, or, altogether, on the nature of the soil, because it is observable even in the same forest; but, in general, it has been remarked, that trees with the thickest bark, and which have been most exposed to the heat of the sun, yield the most. It is usual to select such as are of about four or five feet in circumference.

At the foot of the tree a hole is made in the ground to the depth of eight or nine inches, and which will hold nearly a quart of the juice. Owing to the looseness of the soil in newly made pits, a portion of the

* Lib. 9. cap. 2.

† "*Βελτιστη μεν γαρ ἡ τερμινθος. και γαρ συνεστηκυια, και ευωδεστατη, και κουφοτατη τη οσμη, αλλ' ολιγη, δευτερα δε η ελατινη και πιτυινη. κουφοτεραι γαρ της πευκινης. πλειστη δε η πευκινη και βαρυτατη και πιττωδεστατη, δια το μαλιστα ενδαδον ειναι την πευκην.*" (Ibid.)

By comparing the above description of the *juices* of terebinthiniferous trees with that given by modern writers on the *Materia Medica*, we should almost be led to decide, with positiveness, that the kinds enumerated by Theophrastus were no other than the Cyprian, the Strasburg, and the common Turpentines of the European *pharmacopœiæ*; at any rate, from the description of the (*ρητινη*) *πευκινη*, we cannot but conclude that Bellonius has erred egregiously in considering the *πευκη* of Theophrastus as the *Picea*, and the *Πιτυς* as the *Pinus* of the Roman writers, a conclusion confirmed by a passage in Scribonius Largus, who, in speaking of the *resina pityina*, defines it in these words, "*id est ex piecea arbore.*" (See *Comp. Med.* c. 83.)

juice of course is lost by transudation, but in mixing with the earth, it at length forms a mass sufficiently compact to resist any further draining. Though much attention is generally paid to cleaning the soil contiguous to the pits, sand, leaves, and fragments of bark will inevitably collect in the latter, and render a filtering process afterwards necessary.

In some countries, a hole is cut in the substance of the tree itself near the root, in order to save the juice more free from impurities; but this practice is attended with danger to the former.

When the proper receptacles are prepared, and a little while before the season for making incisions, the coarse bark is stripped off, down to the *liber*, to the extent of about six inches. This precaution is the more necessary, in order that the edge of the instruments employed for making the incisions may not be injured: for if any splinters or filaments should be left in the wounds, the free course of the juice to the pits would be impeded; besides, in taking off the outer bark, it is scarcely possible to prevent fragments from falling down, and mixing with the juice, if any should have been collected, in the pits. As the resin flows most abundantly in hot weather, the incisions are begun near the end of May, and the extension of them continued to September.

After the outer bark has been taken away, the inner bark and a thin slip of wood are cut off, with a very sharp tool, so that there may be a wound in the tree not more than three inches square by an inch deep; this first incision is made near the foot of the tree. Immediately after the operation, the resinous juice begins to exude, in very transparent drops, from the ligneous part and from between this and the bark; the bark itself yields scarcely any.

The hotter the weather the greater is the production of resin, and the flowing ceases altogether at the approach of the chilliness of September. To facilitate the supply, the incisions are renewed once in three or four days, or oftener; for this purpose, the wound is a little enlarged, and a very thin slip taken off each time, so that an incision which, at the beginning of the summer, was only three or four inches in diameter, becomes, by the end of September, a foot and a half wide, and two or three inches deep. The following year a new wound is made just above the former, and managed in a similar manner.

Thus Pines, which have been cut for twelve or fifteen years, have, one above another, twelve or fifteen wounds, and these several wounds reach to the height of as many feet; whence it becomes necessary to ascend steps to make the later incisions. It is not of much consequence on what side of the tree the incisions be made. The operators are commonly guided by the shape of the trunk, the situation of the ground, and the facility of digging pits; but there certainly seems to be some advantage in preferring that side of the tree which is most exposed to the sun. When the pits are filled to a certain height, the juice is taken out with ladles made either of

wood or iron, and poured into pails, in order to be removed to the hollow trunk of a Pine sufficient to hold three or four barrels.

The timber of Pines that have yielded resin even for fifteen or sixteen years is not the less valuable for domestic purposes: and it is a common opinion among the makers of tar, that the roots of such trees produce a greater quantity of that substance than those which have never undergone incisions.

Theophrastus mentions a disease to which Pines are subject, and which seems to consist in a redundance of resin collecting about the roots.* This disease, he says, proves fatal to the tree.

In France, distinct appellations have been given to the several states of the resinous juice of Pines, that which condenses on the wounds towards the decline of the sap being called *Galipot*, in Provence, and *Barras*, in Guienne; the fluid resin obtains the name of *Perinne vierge;* and a thinner kind of the latter, subjected to a sort of filtration, is called *Bijon*, or *Terebithine fine*. The galipot is used by the chandlers in making flambeaux, though the greatest quantity of this substance usually undergoes conversion, by being boiled into *Brai-sec* and *Yellow resin*, to be described presently.

The liquid resin of the Pine, though of inferior quality to that of the Turpentine-tree, the Larch, and the Silver Fir, especially for internal use, is too often substituted for the others in the shops of the druggists. In most terebinthinate preparations this species is the subject, and there is no reason, perhaps, why the essential oil and other parts of it, separately taken, should not be equally good, and possessed of the same properties as what might be extracted from the juice of different trees.

Whilst mentioning the essential oil, it may not be amiss to remark, that this seems to be the most active principle contained in turpentines, the several preparations of these juices manifesting most efficacy according as they are most impregnated with it; hence, in most cases, the common *Oleum Terebinthinæ* seems preferable to the crude resin; but of this oil we shall speak more particularly hereafter.

The Colleges of London and Edinburgh direct the common turpentine to be used chiefly in external applications, for which it was much employed by the ancients also. Celsus mentions "*Resina liquida pinea*," as entering into the composition of many of his *malagmata*, and the "*resina liquida*" of other writers would appear to be of the same kind.

The *Emplastrum Lythargyri compositum*, *Unguentum Elemi compositum*, (Ph. Lond.) both contain this resinous juice as a principal ingre-

* This he calls "ευδαδον γινεσθαι," (Lib. 3. c. 10.) The word Δας seems to have been misunderstood by Pliny, who speaks of the *Tæda* as being a tree itself, instead of a disease incident to it, (see Lib. 16. cap. 18,) which those who will take the trouble of examining the passages in Theophrastus, will plainly see could not have been the meaning of the Greek naturalist.

dient; its digesting, cleansing, and incarnating properties, are acknowledged by medical practitioners universally.

But its use is not confined to the healing art. In common life it helps to form many materials of no small utility, the poorer ranks of people, in many countries, making candles with it, the masons employing it in some of their mastics, the tinners in soldering, and the tallow-chandlers (when it is amalgamated with suet and yellow wax) for making flambeaux.

EXTRACT OF THE JUICE.

(Extractum resinosum Pineum.)

The pure resinous extract of the juice of the Pine has been recommended by some foreign writers for the cure of *gonorrhea*, and is supposed to possess properties similar to those of the Peruvian and Copaiva balsams.

I am not authorised, however, by any personal observation, or by accounts from any of my brethren in England, to mention this preparation in terms of commendation.

YELLOW RESIN.

Terebinthina cocta. Pharm. Wurt.
Resine jaune, of the French.

The mode of preparing this substance is minutely described by the French author whose name we have mentioned above.* He informs us, that the resinous juice is put into a large copper placed over a furnace, which last is usually constructed with a mixture of clay, sand, and straw. Great care is taken that the sides of the furnace should adjoin close to the copper, lest the smoke of the fuel should mix with that of the resinous juice; for, without such a precaution, the heat of the furnace would not fail to set fire to the latter, and there would be a great risk of losing the whole; as an additional safeguard, there is generally a vaulted canal, four or five feet long, affixed to the mouths of the furnace, and terminated by a thick mud wall five or six feet in height.

When every thing has been thus prepared, a moderate fire is kept up with very dry wood, and the juice boiled five or six hours, the operators frequently stirring it about with a large wooden ladle to prevent the impurities which sink to the bottom of the copper from taking fire, a circumstance likely to occur, it is said, without such a precaution. To ascer-

* Duhamel, tom. 2. p. 145.

tain whether the resinous matter is sufficiently boiled, a small quantity of it is taken out of the copper, and poured on a piece of wood; if, when it becomes cold, it may be reduced to powder by being pressed between the fingers, they know that the process is complete, and then conduct it out of the copper into a large trough similar to what is used for receiving the raw juice from the pits, and placed in like manner on supports.

It is necessary to filter the decoction, which is done by pouring it hot on some long straw neatly stretched over wooden bars which form a kind of horizontal grating; the thickness of the straw filter is generally four or five inches. The impurities and dregs remain on the filter, and the juice runs through it pure into the trough. Before the juice becomes cold and fixed, it is let through a hole in the bottom of the trough into barrels, where it is suffered to harden; in this state it assumes a brown colour and a brittle texture, and is called *Brai-sec*, or *Rase*.

To convert it into yellow resin: instead of tunning the hot juice at once into barrels, an eighth part of fresh water is mixed with it in the trough. The water is acted upon so briskly by the hot decoction, that the whole continues to boil an hour or two, and the resin, from a brown colour, becomes at length of a fine yellow. It is afterwards deposited in barrels and suffered to harden like the *Brai-sec*.

The yellow resin, as ordered by the London College, is the result of a different operation, but the properties of both these substances are so extremely alike, that they may be spoken of under the same head; we shall therefore reserve our account of them until we have described the mode of preparing the

ESSENTIAL OIL.

(Oleum essentiale Pineum.)
Oleum Terebinthinæ. Pharm. Lond. & Ed.
Spiritus Terebinthinæ. Pharm. Wurt. &c.
Esprit de Rase, of the French.
Essential oil of Turpentine.

The process for obtaining this oil, as directed in the London Pharmacopœia, consists in distilling five pounds of the resinous juice with four pints of water in a copper alembic. If one pound of the oil be redistilled with four pints of water, the result is called *rectified oil of Turpentine*, *(Oleum Terebinthinæ rectificatum*, of the London and Edinburgh colleges.)

The process of rectification is not unattended with danger, for, unless the luting be very close, some of the vapour is apt to escape; and, if the latter should take fire, the vessels will unavoidably burst. In some dis-

pensatories, this rectified oil is denominated *æthereal.* It does not differ very considerably in specific gravity, smell, taste, or medical qualities, from the common essential oil.*

The *Oleum Terebinthinæ*, as we have before remarked, seems to be by far the most active part of the liquid resin of the Pine, and is, on that account, much more frequently employed in medicine than any other preparation. Its exhibition, however, requires considerable caution, and the admonitions of Boerhaave, Lange, &c. on this subject, cannot be too strictly attended to. The former of these authors, though its panegyrist, speaks of its violently affecting the head, producing bloody urine, and dangerously irritating the whole habit, when given injudiciously or in too large doses; and the observation of practitioners in general tends to confirm this assertion.

Hence, it is proper to employ a very few drops at first, and not to augment the dose without great circumspection. The best vehicle of this powerful medicine is honey, which, with the admixture of a due proportion of powdered liquorice root, forms a good electuary.† Its use in diseases of the kidneys originating from ulcerations and obstructions‡ in those organs, is unquestionable; which is perhaps more than can be said of its alleged virtues in other complaints, and of those there are many in which medical writers of different ages have extolled the advantages of exhibiting turpentine.

Cheyne‖ recommends it as a perfect cure for *sciatica;* but, if I may be allowed to offer the result of my own professional experience, its effects are in few instances successful for the removal of that tormenting disease; and even those cases which I have seen cured, under the use of oil of turpentine, appeared to be rather of the symptomatic than of the idiopathic kind. It is reasonable to presume that the sciatic nerve, from its origin and course, may owe some of its morbid affections to an obstructed ureter, as well as to a rheumatic diathesis. In watching the state of the urinary excretion after the exhibition of turpentine, in more than one case of what is commonly called *sciatica*, I have actually witnessed considerable changes pro-

* Edinb. Dispensatory, (1797,) p. 315.

† The best *formula* for preparing such an electuary is given in the pharmacopœia of Stockholm, which directs half an ounce of the oil to be mixed with one ounce of the best honey and as much liquorice powder as will make the whole of a proper consistence.

‡ I remember a remarkable case of hydatids formed in the kidneys, which came under my care in the Westminster Hospital, and which was very materially relieved by *Oleum Terebinthinæ* given in the dose of about eight drops every four hours. The expulsion of the hydatids seemed to be owing principally to the medicine, for, if the latter was omitted for a few days, the pain of the loins, *dysuria*, and general distress increased; and on resuming it, these symptoms were immediately alleviated, whilst the hydatids were voided in augmented numbers.

‖ Essay on the Gout, (ed. 10.) p. 119.

duced in it, and ascertained the pain about the hip to be mitigated according to the increased presumption of altered action in the ureter.

The efficacy of *Oleum Terebinthinæ* as a *styptic* has been spoken of by some practitioners, but I have not myself witnessed any decided advantages produced by it, and, from having much more reason to confide in other medicines of that class, of late I have ceased to employ it; though, in uterine discharges attending cold, in enfeebled habits, the more stimulative preparations of turpentine may certainly be exhibited with more safety than in the generality of diseases for which they are said to be calculated. As a diaphoretic, in rheumatic and gouty complaints, there are not wanting authorities for the employment of this medicine, but, in modern practice, it is rarely resorted to. Neither have the solvent effects which it has been said to produce (and which seem to have been inferred only from what is known to take place *out* of the body) on biliary *calculi* received much attention in the present day.

In Germany, Norway, and some parts of the Russian empire, the essential oil of the Pine is frequently used as a remedy for lesions of tendons, and for bruises in general. In England, this remedy has repute principally among farriers, but the recommendations of authors so distinguished as Heister, Platner, and Plenck, certainly entitle it to more frequent trial in chirurgical cases.

But the use of the oil of turpentine is not confined to medicine. It is much employed by the painters for rendering their colours more fluid; and the concrete resins are usually dissolved in it when they are to be converted into varnishes.

COMMON RESIN

(*Resina arida Pinea.*
Resina flava. Pharm. Lond.)

Is the residuum of the process for obtaining the essential oil. The process, pushed as far as the nature of the substance will admit of, changes the colour to a deep brown or black, when the resin acquires the name of

BLACK RESIN, or COLOPHONY.*

Resina nigra.

The medicinal properties of these two kinds of resin are, of course, extremely similar. They are rarely used internally, but for external pur-

* I know not how this word came to be applied to the hard resin artificially extracted. It was originally the appellation of a raw liquid resin brought from Colophon, in Ionia, which is described by Dioscorides, (Lib. 1. c. 77.) Galen (*de Camp Med.* Lib. 7.) and Pliny,

poses (particularly as plasters) they can scarcely be dispensed with, being remarkable for their adhesiveness, especially when mixed with other materials. Being deprived of the essential oil, these resins do not produce the same stimulating effects as other preparations, and may be considered as possessing astringency without pungency.

Colophony is of considerable use in the arts. It enters into the composition of several varnishes, and is sometimes substituted for sandarach. Musicians rub the bows and strings of violins with it, in order to take off the more greasy particles, as well as to counteract humidity.

TAR.

(*Pix liquida Pinea.*)

Πιττα, Πισσα υγρα, Κωνος, of the Greeks.

Pix liquida, of the Romans, and of most modern *Pharmacopœiæ*.

Goudron, of the French.

This well known substance,* obtained from the roots and other parts of old Pines by a sort of *distillatio per descensum*, differs from the native resinous juice in having acquired a disagreeable empyreumatic quality from the action of the fire, and in containing the saline and mucilaginous parts of the tree mixed with the extractive and the oily. The Scotch Pine is the species from which most of the Tar used in this country is procured, and perhaps yields it equally good with its congeners.

It is curious to remark how little the process employed in many countries differs from that which was followed by the ancient Macedonians, and which is circumstantially described by Theophrastus, in the third chapter of his ninth book, where he tells us, that the billets were placed erect beside one another, and that they were afterwards covered with turf to prevent the flame from bursting forth, in which case the tar was lost. The stacks were sometimes, he says, one hundred and eighty cubits in circumference, and sixty, or even one hundred in height.† These huge heaps of wood being set on fire, the tar was made to flow from them in channels cut for that purpose.

As all the trees of this genus yield the same substance when treated in a similar way, it is probable that the ancients did not confine themselves to one species for obtaining it, any more than the moderns, and that some

(Lib. 14. c. 20.) Celsus allows the choice of either the *Resina Colophonia*, or the *Resina Pinea*, in the composition of his discutient plasters. Scribonius mentions Colophony as a purgative, (c. 137.)

* As a summary definition of Tar, the words of Pliny, perhaps, cannot be improved: "*Pix nihil aliud est*, (says he) *quàm combustæ resinæ fluxus.*" (See lib. 23. cap. 1.)

† Η συνθεσις κυκλων ἡ ογδοηκοντα και εκατον πηχεων εις υψος δε εξηκοντα, πλεον η πεντηκοντα, η εκατον αμφοτερως." (*Loc. supra citat.*)

variety was occasioned in the product according to the different management of the fire, and in the cooling. Hence arises the confusion, and the difference of opinion among commentators respecting the terms *Cedria*, *Cedrœleon*, *Pissœleon*, &c. which, after the most industrious collation of passages from Theophrastus, Dioscorides, Galen, and Pliny, it is scarcely possible at this day to refer to the precise substances which they were intended to designate.

But, we shall now proceed to point out the mode of procuring tar which Duhamel* states to have been practised in the Valais, and which seems to be the best that has been adopted.†

It is usual to cut down the Pines intended to be burnt for the extraction of Tar, in the course of the summer. The operators, knowing the quantity that will be wanted, regulate the extent of the hewing and tearing up of the trees, so that the materials may be neither too green nor too dry at the time of preparing their ovens, for, to make good tar, they should not be more than half dry.

As all parts of the Pine (the trunk, branches, and even the bark) yield this substance, the branches are cut of a length proportionate to the size of the oven, and the thicker parts chopped into little billets similar to what are used in faggots. The ovens are shaped like an egg placed on its smaller end, and are composed of earth and stone, the floor being formed of one or more pieces of freestone, which are very nicely joined, and hollowed like the inside of an egg-shell. On one side there is a hole about an inch and a half in diameter, and six inches in depth; to the external orifice of this, and five or six inches higher than the bottom of the oven, a gun-barrel of a large caliber is affixed, and there is a large iron grate placed at the bottom of the oven. The dimensions of the oven vary according to the quantity of wood intended to be burnt, the largest being about ten feet high, five or six feet in diameter in the middle, and two feet and a half at the mouth or superior part. The walls are about a foot and a half in thickness. To about two-thirds of the height these are constructed with freestone, but above them with oven-earth. When the ovens are finished, and quite dry and tight, bundles or faggots of the wood, tied up with hazel or vine rind, are set upright on the grating; the ligature is cut by means of a blade fixed at the end of a stick; and the pieces are spread about, the interstices being filled with chips. This first layer being properly made, a second faggot is let down, then a third, and so on until the oven is full, as high as the hand can reach, when chips and shavings are laid on, to the thickness of three or four inches, and the mouth is covered with flat stones piled upon one another so as to close all gaps

* *Traitè des Arbrés*, tom. 2. p. 160.

† The reader may be gratified in consulting the work of John Conrad Axtius, (entitled, *Tractus de Arboribus Coniferis et pice conficiendá.*" Iona. 1679. 12°) which contains much curious matter on this subject, as well as on the products of Pines in general.

except at the centre, where an opening is left four or five inches in diameter.

All things being thus prepared, the chips at the top are set on fire, and the operators, who from experience are enabled to ascertain when the materials are sufficiently kindled, seize the proper time to shut up the mouth entirely with a flat stone; and they stop up with earth every interstice from which smoke is seen to escape. The wood then becomes reduced to charcoal, and the resinous part of it, mixed with the sap, flows through the grate down into the cavity at the bottom of the oven. When this cavity is full up to the place where the iron tube is fixed, the tar flows into barrels placed to receive it. It is from custom alone that the persons who superintend the operation, ascertain when the wood has given out all its resinous liquor; they then open the top of the oven, removing the stones, and collecting the soot which lodges in their interstices as well as on the sides of the oven, and which forms a kind of *lamp-black;* lastly, they take out the charcoal that has lodged on the grating, and recommence the operation by laying on wood as before. Such impurities as are heavier than the tar, with which they were mixed, remain on the stone that serves as a floor to the oven, whilst the tar itself flows on the surface through the tube, which, as we have remarked before, is five or six inches above the level of the stone.

As far as we can judge, all the art of the operation consists in a proper management of the fire, for, if the oven be too closely stopped, the fire is extinguished, the wood is but imperfectly charred, and very little tar is extracted; but if, on the contrary, the wood burn too briskly, a great proportion of the resinous matter is consumed. When the fire is properly regulated, there is no flame in the oven; the heat and smoke, which are reverberated on the wood, cause the resin and sap to flow from the latter together. It would seem that a certain mode of regulating the heat would be, instead of closing the top of the oven with stones and turf, to adapt registers of different sizes to a kind of dome, which might form the upper part of it, and render the structure more neat and commodious.

Tar has been used as a medicine both externally and internally. The ancients had a high opinion of its efficacy in pulmonary diseases, supposing it to promote expectoration, relieve dyspnœa, and check spitting of blood. Dioscorides particularly speaks of its utility in these cases. He also recommends it to be applied to ulcers, which, he says, it fills up and heals, whether they be situated on the surface of the body, or in the ears, throat, or other internal parts.* In fact, there is no end to the praises bestowed by medical writers on the properties of tar, which, if we are to give credit to all the accounts given of it, is equal to the cure of all the maladies of the human frame.

* See also Pliny, lib. 24. c. 7.

The colleges of London and Edinburgh direct it to be made into an ointment *(Unguentum Picis)*; the former, by means of the admixture of an equal portion of mutton-suet, and the latter, of two-fifths of yellow wax. This ointment has been employed for the cure of cutaneous affections, particularly those of domestic animals. Some practitioners have applied a plaster of tar for the cure of obstinate cases of *Tinea capitis*, and not without success; but it is a very painful, and almost a cruel, remedy, for it cannot be taken off without dragging out of the skin adhering to it the roots of the hair, in the eradication of which, in fact, consists the only use of the plaster.

TAR-WATER.

(Infusum Picis liquidæ Pineæ.)
Aqua Picea. Pharm. paup.

Water impregnated with the more soluble parts of tar, and hence called *Tar-Water*, was once a very popular remedy for various obstinate complaints, both acute and chronic. It was indebted for its great reputation principally to the celebrated Dr. George Berkeley, Bishop of Cloyne, who wrote a long dissertation on it, under the title of "*Siris, or a chain of philosophical reflexions and enquiries concerning the virtues of Tar-Water.*" A narrative of its success, with a great number of cases and remarks, was published also by Thomas Prior, Esq. From the accounts given by these writers and by Cullen (who appears to have entertained no mean opinion of its efficacy) it appears to strengthen the tone of the stomach, to excite appetite, promote digestion, and remove many dyspeptic symptoms, at the same time increasing the excretions, particularly that of urine. Cullen believed the virtues of this medicine to depend chiefly on the acid principle it contains, and it was on this account that the Bishop of Cloyne preferred the Norway Tar (made from *Pinus Abies*) to that of New England; this acid, however, does not appear to differ from that which is extracted by fire from all kinds of recent wood.*

The proportions recommended by the Bishop are a gallon of cold water to a quart of tar; these are to be mixed thoroughly by means of a ladle or flat stick, with which the liquor is to be stirred for the space of three or four minutes; and the vessel containing it must stand forty-eight hours, that the tar may have time to subside; the former is then strained.

Tar-water distilled yields a liquor much impregnated with its flavour, though more grateful than the infusion itself both in smell and taste. There remains a light, spongy, blackish matter, not acid, but bitter, partially soluble again in water.

* Lewis's Mat. Med. Art. *Pix liquida.*

Whatever commendation tar water may formerly have had, or may justly be entitled to, it does not receive much in the present day, being but little used, on account of other medicines appearing to possess the same properties in a more exalted degree; and indeed, there are other *terebinthinate* preparations better suited than this to answer the purposes for which it was formerly recommended, as will be mentioned in the course of this dissertation.

PITCH.

(Pix pinea inspissata)
Βοσκας *of the Greeks. Spissa Pix.* Pliny.
Brai-gras, of the French.

The usual mode of making pitch consists in melting coarse hard resin (or *brai-sec*, as it is called in France) with an equal quantity of tar, in large copper vessels similar to those used for boiling the raw juice. If the tar be too thin, the proportion of resin is increased; and, on the other hand, if it be thick, a third part of tar is sufficient. Should the process of inspissation be carried to its utmost limit, the pitch becomes quite hard and dry, and is called in the shops *Pix arida*, (the Πισσα ξηρα, and Παλιμπισσα of the Greek writers,) which is less pungent and less bitter than the common tar, and is used only in some external applications, as an adhesive substance agreeing in its medicinal virtues with the common digestives.

When melted with oils, resins, and fats, into ointments and plasters, pitch is said to be very apt to separate and precipitate. Dioscorides describes the best pitch as being shining, odorous, gummy, and of a reddish black colour, which were the qualities of the Lycian and Calabrian pitch.* It was prescribed by him, and also by Celsus, as a proper ingredient in plasters for maturing abscesses and healing wounds.

Pitch was much employed by the ancients for giving flavour and fragrance to their wines, which were also supposed to acquire from it useful medicinal properties, as we have before remarked, when speaking of the properties of terebinthinate substances in general.† Their mode of pitching casks and other vessels is described by Columella.‡ We are told by Pliny of a preparation of tar with vinegar, called *Brutia*, which was employed for the same purposes; § and this author says that it was usual to sprinkle the first ferment of new wine, or *mustum*, with powdered resin.

In boiling down tar to dryness without addition, there comes over an acid liquor in considerable quantity, and also an ethereal oil, which seems

* Lib. 1. c. 81. † See page 149. ‡ "*De re rustica.*" Lib. 12. c. 18.
§ Lib. 16. cap. 11.

to differ from the oil of turpentine only in being impregnated with an empyreumatic quality; it was called by the ancients *Oleum Picinum*. The medicinal properties of this oil are similar to those of tar.*

The extensive use of pitch and tar in ship-building is too well known to require particular mention. A mixture of pitch and wax, by which crevices in vessels are rendered impermeable to water, was called by the ancients Ζώπισσα; and this substance, after it had been some time steeped in the sea, was used immediately as a resolvent.† Blended with a certain quantity of oil and suet, pitch becomes an useful article to shoemakers, for waxing their threads, and with whale fat it forms the grease with which wheels of carriages are smeared over. In several kinds of luting also, this article possesses considerable utility, and is familiar to most mechanics and handicraftsmen.

LAMP-BLACK.

(Fuligo Pinea.)
Noir de fumee, of the French.

Any species of Pine may be used for making lamp-black, but the general practice is to convert the impurities left in the precipitation of tar and pitch to this purpose. The mode followed in Germany is thus described by Axtius, who has been copied by Duhamel, and it is illustrated in the works of both these authors by engravings.‡ A sort of box is made, nicely closed in every part with the exception of some holes in the top, which are covered, however, with a sort of linen cone. At a little distance from the box a furnace is constructed, with a very small mouth, and the inferior part communicating with the inside of the box by an horizontal chimney. Into this furnace are put the dregs and coarser parts left in the preparation of tar, and in proportion to the consumption of these a supply is kept up, so as to furnish a constant draught of smoke to the box. The smoke goes chiefly into the cone, where it deposits its grosser parts in the form of soot, which when beaten off from the linen by sticks applied on the outside, is collected from the upper part of the box and put into barrels.

Lamp-black is employed almost exclusively in printing and dyeing in the present day, but it was formerly used as a substitute for the *Fuligo Thuris*, which is mentioned by Dioscorides and Celsus as a resolvent and digestive, and formed an ingredient in some of their plasters. The first of these authors describes a process for obtaining lamp-black literally by means of a lamp, and attributes to it astringent properties (especially in ichorous discharges from the eyes) as well as a remarkable efficacy in promoting the

* Dioscorid. lib. 1. c. 79. † Ibid. c. 82.
‡ *Tract. de Arb. conif.* c. 15. *Traité des Arb.* tom. i. p. 17. fig. 4.

growth of hair on the eye-brows.* Galen also adverts to the same remedy in his account of the fuliginous substances prepared from different kinds of resin.†

There is a *Tinctura Fuliginis* retained in the Edinburgh *Pharmacopœia:* this is exhibited internally, as an antihysteric, but rarely trusted to alone, being found most efficacious when combined with assafœtida, or other medicines of that class, to all of which it seems to be far inferior. It is directed to be prepared from *wood-soot,* without any particular tree being specified as preferable for this purpose to another.

BARK-BREAD.

We are informed by Linnæus‡ that the Laplanders eat, during a great part of the winter, and sometimes even during the whole year, a preparation of the inner bark of the pine, which is called among these people *Bark-broed.* This substance is made in the following manner, viz. After a selection of the tallest and least ramose trees, (for the dwarf branching ones contain too great a quantity of resinous juice) the dry and scaly external bark is carefully taken off, and the soft, white, fibrous, and succulent matter collected and dried.

The time of the year chosen for this process is when the *alburnum* is soft, and spontaneously separates from the wood by very gentle pulling, otherwise too much labour would be required. When the natives are about to convert it to use, it is slowly baked on the coals, and being thus rendered more porous and hard, is then ground into powder, which is kneaded with water into cakes and baked in an oven.

The Siberian ermine-hunters, when their ferment or yeast which they carry with them to make their *Quass,* is spoiled by the cold, digest the inner bark of the pine with water over the fire during an hour, mix it with their rye-meal, bury the dough in the snow, and after twelve hours find the ferment ready prepared in the subsiding fæces.§

THE MUGHO PINE.

LIQUID RESIN.

(Resina liquida Pini Pumilionis.)
Balsamum Hungaricum, of the German *Pharmacopœiæ.*
Hungarian Balsam.

This resin spontaneously exudes from the extremities of the branches, and from other parts of the tree, and may also be obtained, by expression,

* Dioscorid. lib. 1. c. 79. † *Simpl. Med.* lib. 7. ‡ *Fl. Lapp.* Smith. p. 284.
§ Pallas. *Fl. Ross.* 1. p. 2, 3.

from the green cones. Its reputation as a medicine originated from a manuscript account written by Dr. Christian ab Hortis, of Käsmark, who extolled its efficacy in the cure of wounds, running ulcers, contusions, rheumatisms, palsies, and even of the gout.*

Various other complaints were said to be cured by it, and it afterwards received the commendations of Fischer,† Breynius,‡ and Bruckmann,§ the first of whom considered it not inferior to the Balsam of Mecca.

In Germany, this balsam still retains high repute, but there can be no doubt that its medicinal virtues have been much exaggerated.

ESSENTIAL OIL.

(Oleum essentiale Pini Pumilionis.)
Oleum templinum, of the German *Pharmacopœiæ*.
Krumholz-oil.

This essential oil is obtained by distillation from the resinous juice just described. The common oil of turpentine is often substituted for it by the itinerant druggists in Germany, but the genuine sort may be distinguished by its golden colour, agreeable odour, and acrid oiliness of taste.‖

As a medicine, this oil is a popular remedy at Brunswick for the cure of intermittents, being taken, in the dose of a few drops, just at the commencement of the cold stage. It is also used in punctures of tendons, and by farriers as an application to foul ulcers of cattle.¶

THE STONE PINE.

KERNELS.

(Nuclei Pineoli.)
Πιτυιδες. Diosc. Lib. 1. c. 74.
Pignons of the French.

These kernels have a subacid, sweet taste, similar to that of almonds, and, like the latter, may be used for emulsions as well as for dissolving resins. They possess a nutritive and demulcent quality, but, from their oily nature, soon become rancid and unfit to be eaten. Dioscorides speaks of their utility in coughs, and it is probable enough that they act as expectorants in some degree; in the present day, however, they are rarely used, except at the table.**

* See Murray's *App. Med.* vol. i. p. 12.
† Bresl. Samml. Vers. 2. p. 331.
‡ Eph. N. C. Cent. 7. p. 5.
§ *Specim. duo.* 1727.
‖ *Hermann, Matt. Med.* T. 2. p. 194.
¶ *Murray*, vol. i. p. 13.
** *Mat. Med.* p. 121.

The Siberian Stone Pine (*P. Cembra*) yields nuts of the same kind as these, which are, therefore, applicable to the same purposes, but their oily contents, when exposed to the air, manifest a still stronger disposition to acquire rancidity..

The proportion of oil in the kernels of these nuts is larger, perhaps, than in those of any other tree, one pound of them yielding five ounces, whereas the same quantity of linseed produces only two ounces and a half.* Rhaze speaks of the oil having a tendency to relieve obstructed kidneys, a circumstance not improbable, and well deserving of being put to the test of experience, if it were only for the sake of substituting what would be so much more agreeable to the palate than the common turpentines.

THE SIBERIAN STONE PINE.

ESSENTIAL OIL.

(*Oleum essentiale Pini Cembræ.*)
Balsamum Carpathicum, of the Germans.
Balsamum Libani. Murray, *App. Med.* vol. i. p. 15.
Carpathian Balsam.

The German writers describe the Carpathian Balsam as being pellucid, very liquid, and of a whitish colour, and as having an odour and taste like oil of Juniper. We are informed that it is extracted by distillation, from the shoots of *Pinus Cembra*, after they have been bruised, and macerated a month in water.

It was brought into notice by the authors who are mentioned above as having treated of the Krumholz-oil, and they have recommended it to be rubbed on the temples, for the cure of *vertigo*, and to be dropped into the ears for the cure of *susurrus* and difficulty of hearing.

Like all other popular medicine, this balsam has reputation, in Germany, for performing great wonders in many complaints of very opposite characters, as pleurisy, erysipelas, *calculus*, and putrid disorders; hence its alleged virtues are not to be too hastily credited.

* Haller *Helv.* (tom. ii. p. 317,) on the authority of Spielman.

THE SILVER FIR.

LIQUID RESIN.

(Resina liquida pytuina)

Terebinthina Argentoratensis, or Strasburg Turpentine. Dale's *Pharm.* (Ed. 1737) 277.

THIS resin is generally of a middle consistence between that of the *Terebinthus* and the *Larix*; more transparent and less tenacious than either; in colour yellowish brown; in smell more agreeable than any other turpentine, except the Cyprian; in taste the bitterest, yet least acrid.

Our own shops do not now retain any liquid resin under the name of Strasburg Turpentine, but it is sold in several parts of Germany, where its reputation still exists; and, according to some authors,* this sort is to be considered as equal, if not superior, to all the other substitutes for the genuine juice of *Pistachia Terebinthus*.

The greatest quantity is collected by the peasantry living in the vicinity of the Alps, who set out every year towards the month of August, provided with sharp-pointed hooks and a bottle suspended to the waist, for the purpose of puncturing the vesicles adhering to the bark of the trees. It is a curious sight, says Duhamel,† to observe the peasants climbing to the very top of the highest firs by means of the cramp-iron with which their shoes are armed, and which pierce the bark, their two legs and one arm grasping the trunk, whilst the other arm is employed with the hook. Some of them make use of a pointed bull's horn, which serves both as an instrument and a receptacle, and as soon as it is filled, the resin is poured into the bottle; the bottle is afterwards emptied into a larger, or into skins, which are used for conveying the resin to the most advantageous places of sale.

As it often happens that leaves, fragments of bark, moss, &c. fall into the horns, the resin is purified by filtration; for which purpose a piece of bark is stripped off from a fir to make a kind of funnel; at the narrow end of which are put some shoots of the same tree, and then this funnel is filled with the resinous juice which has been collected; the juice gradually flows through, and the extraneous matter remains enveloped in the shoots. This is said to be the only preparation used previous to sale.

Very little resin is collected by incisions in the bark of *Pinus Picea*, the great supply being from the vesicles, which may be distinguished from those often formed in the pores of *P. Abies* by the juice of the former

* Matthiol, p. 107. 334. Haller, p. 314.
† *Traité des Arbres*, tom. i. p. 9.

remaining clear and transparent like mastic, whereas that of the latter, in thickening, becomes opaque like frankincense. The vesicles found under the bark of *P. Picea* are sometimes round, and sometimes oval, but it is remarkable that in the latter case the longest diameter is always horizontal, and never perpendicular.

In places where the trees appear to be rich and the soil substantial, liquid resin is collected twice in the year, namely, in spring as well as in autumn, but no tree produces vesicles more than once during the ascent of the sap; in poor soils indeed vesicles are produced only in the spring.

The trees begin to yield a moderate quantity of resin as soon as they are three inches in diameter, and continue to do so until they are increased to a foot; at this period, the wounds made in the bark form hard and horny scales; the woody part continuing to enlarge, forces the bark, which is hard and incapable of extension, to crack open, and in proportion to the increase of size in the tree, this bark, which, when the latter was young, did not acquire greater thickness than a quarter of an inch, at length grows to an inch and a half, and then it yields no more vesicles.

Lewis says, that the Strasburg turpentine is procured both from the silver and from the red fir, by cutting out, successively, narrow strips of the bark, from as high as a man can reach to within two feet of the ground;* but we are informed by Duhamel (from whose work the above account is principally taken) that this practice is confined to *Pinus Abies*.

The uses to which the liquid resin of the silver fir is applied are, for the most part, so similar to those mentioned under the head of *Resina liquida larigna*, that we shall not detain the reader with any account of them in this place.

THE BALM OF GILEAD FIR.

LIQUID RESIN.

(Resina liquida balsamea.)
Balsamum Canadense. Pharm. Lond. et Ed.
Beaum blanc de Canada, of the French.
Canada balsam.

THIS is a transparent whitish juice, brought to this country from Canada, and apparently not very different in its qualities from the celebrated *Balm of Gilead*,† so high in esteem among the eastern nations, and so strongly recommended in a variety of complaints.

* *Mat. Med.* (Ed. 4.) vol. ii. p. 417.

† The product of *Amyris Gileadensis*, and probably the *Balsamum Judaicum, Syriacum, è Meccâ, Opobalsamum*, &c. of the older writers.

Hitherto, however, it has not been much employed in England, yet it is thought capable of answering all the purposes for which the Copaiva balsam is employed, and would therefore deserve a more general trial. It has an agreeable odour, and a strong, pungent taste.

THE NORWAY SPRUCE FIR.

CONCRETE RESIN.

(Resina concreta abiegna.)
*Thus.** Häller. *St. Helv.* 2. p. 313.
Poix, of the French.

THIS substance spontaneously exudes from the pores of the tree, and soon concretes into distinct drops, or tears, which differ from the produce of the Silver Fir in being compact, opaque, and of a deeper yellow colour. The common frankincense of the shops is probably no other than this resin, or, at least, the latter is in general mixed with the former, and becomes an ingredient in the *Emplastrum Thuris compositum*, and *Empl. Ladani compositum*, of the London *Pharmacopœia*, applications employed as corroborants and constringents, but useful chiefly from their mechanical properties, by which considerable support is afforded to the integuments whereon they are laid.

BOILED RESIN.

(Resina abiegna cocta.)
Pix Burgundica, Pharm. Lond. &c.
Poix-grasse, of the French.
Burgundy Pitch.

THIS substance is of a close consistence, but rather soft, of a reddish brown colour, and not unpleasant smell. The shops are supplied with it chiefly from Saxony, where, however, many adulterations take place, and,

* The *Thus* of the ancients does not appear to have been the product of any species of *Pinus*, but, as we are informed by Dioscorides, (lib. i. cap. 70,) pine resin was often substituted for it; and the substance now bearing that name in the shops is seldom any other than the concrete resin described above. Dioscorides describes a mode of distinguishing the two kinds. "Resin," (of the Pine) says he, "when thrown into the fire dissipates itself in smoke, whereas frankincense burns with a brisk flame, and the odour of the latter serves to detect imposition." Some writers are of opinion that the genuine Λιβανος, *Thus*, or Frankincense, is obtained from *Juniperus Lycia*, and constitutes the *Olibanum* of our shops, but I cannot find any passages in ancient authors sufficiently precise to corroborate this conjecture.

in this country, it is to be suspected that a preparation of the common turpentine is sometimes substituted for it.

The genuine Burgundy Pitch is prepared from the resinous juice of the Norway Spruce, which is yielded by that tree from the month of April to September, from the effect of incisions made in the bark. In the operation of cutting, the wood is left untouched, for the juice exudes chiefly from *between* the bark and the wood, and in small quantities from the former alone, but not at all from the latter. It fixes almost immediately after it is freed from its lodgments, and therefore does not flow to the ground, but remains attached to the tree in large tears or flakes. This concrete matter is collected once in a fortnight, by detaching it with an instrument formed on one side like an axe, and on the other like a gorget. With this instrument also the incision is renewed every time that the resin is collected.

The resin of young Spruces is softer than that of old ones, but it is never fluid, except in hot countries, and under considerable exposure to the sun; and even in those circumstances it has not the same liquidity as that of the Pines properly so called. In forests impenetrable to the rays of the sun, the incisions are usually made on the south side, but in different situations this is not always the practice; the side most exposed to rain is never subjected to incisions. If only one incision be made in a spruce, there will be a supply of resin from twenty-five to thirty years. A vigorous tree, planted in a good soil, will yield in one year thirty or forty pounds of juice.

This juice becomes dry enough to be put into sacks, and is thus conveyed by the peasants to places where the following process is carried on, viz. The resinous substance is put, with a proper quantity of water, into large boilers; a moderate fire melts it; it is then strained, under a press, through strong, close cloths, into barrels, to be transported to any distance. It is rarely cast into loaves, because these would be melted by a low degree of heat, and easily put out of shape.

The above is the mode practised in the neighbourhood of Neufchatel,* but it is different in other places, as will be seen by consulting Axtius,† Geoffroy,‡ &c.

Burgundy pitch is employed only externally. Formerly, it was an ingredient in a great variety of ointments and plasters, but at present its use is confined by the London College to the *Emplastrum Cumini*, and to another which takes its name from this resin, viz. the *Empl. Picis Burgundicæ compositum*. It forms a warm, stimulant application, and sometimes creates even vesications, though, in general, a redness of the part, with a gentle exudation, is the only effect observable.

The cases in which the *Empl. Picis Burg. comp.* seems to produce most

* Duhamel, tom. i. p. 15. † *Tract. de Arb. conif.* p. 79.
‡ *Mat. Med.* t. iii. p. 437.

good are those which may be called *nervous dyspnœa;* but it is serviceable likewise in coughs, pains of the muscular parts of the chest, and some affections of the trachea occasioning loss of voice. It should be renewed once in three or four days, and so continued for a fortnight or longer.

BRANCHES.

(Ramusculi abiegni.)

The *effluvia* of the Norway Spruce are supposed to effect a salubrious impergnation and coolness of the air, on which account it is usual in Sweden to cut the branches into pieces of about half a finger's length, and strew them on the floors of apartments tenanted by invalids.* Jonston, in his *Dendrographia*, speaks of the wholesomeness of walking in groves of Pines; and Linnæus informs us that the Laplanders apply the young shoots to the head, for the removal of pains in that part.†

THE WHITE SPRUCE FIR.

SPRUCE BEER.

(Decoctum Abietis compositum.)

This drink seems to be the best of any that is made from parts of firs or pines, being not only most agreeable to the palate, but also most answerable to the indications of cure in those complaints for which decoctions and infusions of cones, tops, leaves, &c. of various species, have been prescribed. The *Decoctum Turionum Pini*, the *Essentia Abietis* (of the Augustan college) and other forms prescribed for the prevention and removal of scurvy, will probably soon give way entirely to the American Spruce Beer, the mode of preparing which we shall extract from the valuable French writer, of whose work we have availed ourselves so much already.‡

To make a cask of Spruce Beer, there ought to be a boiler large enough to hold one-fourth more. This is to be filled with water, and as soon as the latter begins to boil, a bundle of Spruce branches broken into pieces is to be thrown into the boiler; the bundle should be about twenty-one inches

* Murray, vol. i. p. 29. † *Flora Lapp.* (Smith's Edit. p. 287.)

‡ The reader may consult also the description given by Kalm, in the *Trans. of the Acad. of Sc. of Stockholm* for 1751, p. 190. This traveller's countryman, Dr. Arvid Faxe, published a mode of making this sort of drink from the *Scotch Fir*, which, as well as many other species of *Pinus*, may, no doubt, be made to answer where the Spruce firs are not to be found. Duhamel thinks that juniper may be substituted for spruce.

round, at the place of ligature. The water is to be kept boiling until the rind becomes easily detachable from the branches, and whilst this process is going on, a bushel of oats are to be roasted several times over in a large iron pan, and fifteen sea-biscuits, or, instead of these, twelve or fifteen pounds of bread cut into slices, should be well browned, to be mixed altogether with the liquor in the boiler. The branches of Spruce are then to be taken out, and the fire extinguished. The oats and bread fall to the bottom. The leaves, &c. floating on the surface of the liquor being skimmed off, six pints of molasses, or coarse syrup of sugar, or, in default of these, twelve or fifteen pounds of brown sugar, are to be added. This mixture should be immediately turned into a fresh port-wine cask, and, if it be intended to give a colour to the beer, the dregs, and from five to six pints of the wine may be left in the cask. Whilst the liquor remains tepid, half a pint of yeast must be added, and briskly stirred about, in order to incorporate it well with the decoction, after which the cask is to be filled up to the bung-hole, and the latter left open. The liquor will ferment and throw off a good deal of excrementitious matter; in proportion to the quantity that works out, the cask is to be replenished with some of the same decoction kept apart for the purpose. If the bung-hole be stopped at the end of twenty-four hours, the spruce remains sharp like cyder; but if it be intended to drink it softer, the bung must not be put in until the fermentation is over, taking care to replenish the cask twice a day.

The writings of physicians and voyagers abound with testimonies of the antiscorbutic virtues of Spruce Beer, the reputation of which seems now to be so general and so well founded, that it is wholly unnecessary to dwell on this subject. The beverage has not only its wholesomeness, but becomes pleasant to the palates of most persons who have habituated themselves to its use. From its refreshing and strengthening qualities it is very generally had recourse to as a common drink during the heats of summer, and is considered almost as much a luxury at the table as a valuable article of medicine.

By what particular principle in the liquor its power of preventing and subduing scorbutic complaints is effected, or whether this efficacy be not the result of the general preparation, does not appear to be as yet determined; but, as simple decoctions and infusions of the branches of several species of *Pinus* have been found conducive to the same purposes, it is most reasonable to suppose that the spruce alone is the essential part of the medicine.

Some authors have imagined the salutary properties of medicines of this sort to consist in their gently increasing the secretions from the kidneys; whilst others have contended for a peculiar power in the vegetable acids to promote venous absorption. Whatever be the *modus operandi*, however, the acid contained in infusions of fir, and which has been called

Acidum Abietis, has been found, when exhibited by itself, to act as a diuretic,* and though the properties of this acid may be no way different from those of others extracted from vegetable substances, it is highly probable that this is one of the most active principles in terebinthinate infusions.

THE LARCH.

LIQUID RESIN.

(Resina liquida Larigna.) *Largatum* of the Italians.
Terebintha Veneta. Pharm. Ed.
Venice Turpentine.

This resin is by most writers, and in the shops, esteemed the best (after that of *Pistachia Terebinthus*) of those juices commonly called *Turpentines*. It is usually thinner than any other sort, of a pale yellowish colour, and of a hot, pungent, bitterish taste. The smell is strong, and far from being agreeable. Though it bears the name of *Venice Turpentine*, very little of it is exported from the Venetian territories; but it is probable that the merchants of that country were the first who substituted it for the genuine Tupentine of Cyprus. That which is most commonly met with in the shops comes from New England; from what tree we are uncertain. The true liquid resin of the larch is obtained chiefly from France and Germany.

The extraction of the juice of the larch is performed by boring holes, of about an inch in diameter, and with a gentle descent outwards, in the most knotty parts of the tree, proceeding from the height of two inches above the ground to ten or twelve. The south side is generally preferred, on account of the sun's heat facilitating the flow of the juice. There are adapted to the holes what may be called gutters, which are fifteen or twenty inches in length, and terminate like pegs perforated in the centre. The juice passing along these tubes falls into troughs placed at their most depending part. The result of the process is carefully examined every morning and evening, from the end of May (which being the time at which the trees are fullest of sap, is also that at which they are generally perforated) to the end of September. As soon as the supply appears to diminish, the holes to which the gutters were attached are stopped up with pegs for about a fortnight, after which interval they are opened again, to

* The late Dr. Hope made frequent trial of this acid in the Royal Infirmary of Edinburgh, and conceived it to be beneficial in obstinate coughs and catarrhs. (See Lewis's *Mat. Med.* Art. *Abies*.)

discharge the re-collected resin. This operation is repeated until the tree being drained furnishes but a very small quantity of juice; the pegs are then replaced, and not withdrawn until the succeeding season. As it is impossible to secure the troughs from leaves, and other extraneous matter which will mix itself with the fluid, the latter is usually strained through a hair sieve into other vessels, in order to be transported to the places of sale. It is only from the most healthy and vigorous trees that the resinous juice is obtained; those which are too young or too old produce only a small quantity, though at all ages tears of this substance may be seen on various parts of the trees, and especially where knots exist. Some of the mature trees (Haller says*) will discharge five pounds of juice in a year.

The resin seems to reside in the exterior circles of the wood, for, if the healthiest part of the tree be cut into billets, there are often found, at the distance of five or six inches from the inmost part, *depots* (as it were) of this resinous matter, which are sometimes an inch in thickness, three or four inches in width, and as many, or more, in length. In a tree thirty or forty years old, it very frequently happens that five or six of these reservoirs are found, and a multitude of smaller ones, which occasion great inconvenience in sawing, on account of the teeth of the saw being clogged by the glutinous matter.†

The resinous juice of the Larch is said to remain always, or at least a very long time, in a state of liquidity; if it should at length become at all concrete, it would be only at the edges, or on the sides of the vessel in which it may be contained.‡ This property is adverted to by Pliny.§

The resinous juice of the Larch is substituted, in medicine, for that of the true Turpentine tree, under those circumstances to which the latter is supposed to be particularly suited. As a diuretic the Venice turpentine is generally preferred to all the other sorts, and it loosens the belly most, on which account Riverius|| thinks it more safe than most other irritating diuretics. Some authors have thought that it had a greater tendency to produce vertigo, and even drunkenness, than other terebinthinate juices, when taken internally, but this is not well ascertained. Cullen** observes, that its effects, when it is employed in an *enema*, are more certain and durable than those of saline medicines, for remedying obstinate constipations of the bowels. Other practitioners have employed it with advantage in some nephritic cases, exhibiting it in a similar form, by the *rectum*.

With regard to external use, this resin is much employed in the Tyrolese territories for the cure of wounds. It forms a part of several plasters and ointments, as, for instance, the *Emplastrum de Belladonna*, of the Bruns-

* *Stirp. Indig. Helv.* tom. ii. p. 314.

† Duhamel *Traité des Arbres*, tom. i. p. 335.

‡ *Duplessy*, tom. ii. p. 268.

§ Lib. 16. c. 10.

|| *Prax. Med.* lib. 14. c. 1.

** *Mat. Med.*

wick pharmacopœia, the *Unguentum Infusi Cantharidum*, of Edinburgh, and the *Ung. digestivum*, of the Russian shops, being esteemed not only on account of its mechanical uses, but as an efficient digestive and discutient.

GUM.

(Gummi Larignum.)
Gummi Orenburgense, of the Russian shops.

This gum does not appear to be used any where but in Russia, yet it is described as a good substitute for *Gum Arabic*, of which it possesses much of the glutinous quality. It is dryish, of a reddish colour, and of a sub-resinous taste, but wholly soluble in water.

The mode in which this substance is obtained is very remarkable.* It sometimes happens that whole forests of Larch, in some parts of the Russian empire, are consumed by fire, in consequence of the flames being driven from the open hearths of the huntsmen to the foliage of the trees by a high wind. During the combustion of the medullary part of the trunks, a gum issues forth, which is diligently collected by the natives for the purpose not only of rendering their bows glutinous, but also of being eaten as a delicacy. It is likewise supposed to act medicinally, as an antiscorbutic, and an useful astringent of the gums.

MANNA OF THE LARCH.

(Manna Larigna.)
Manne de Briançon, of the French shops.

About the month of June, and when the sap of the Larch is most exuberant, this tree produces small white drops of a sweet, glutinous matter, like Calabrian manna. The young trees generally produce most, appearing quite white with it early in the morning, before the rays of the sun have acted strongly and dissipated it; and, what is very singular, it adheres almost exclusively to the extremities of the branches. Bellonius† remarked that (as was the case with the Cedars of Mount Libanus) the drops are discoverable only on those trees which occupy the highest spots. Professor Martin‡ noticed a hoary powder on a Larch which grew near his house, in the year 1798, but neglected to examine whether it had any of the qualities of manna. The following year there was no appearance of this powder, which (as the Professor observes) may be accounted for from the latter being a cold, wet season, and the former a hot, dry one.

* Pallas, *Flora Rossica*, vol. i. p. 2.

† "*De Arb. coniferis.*" (Paris, 4to. 1553.) p. 9.

‡ Miller's Dict. Pinus *Larix.*

We are informed by the French author above quoted, that the manna is collected by the peasants, who go very early in the morning to the forests, and lop off with hatchets the branches that bear it, carrying these afterwards to the shade, where they can collect the grains at their leisure. It is then sold to merchants, who fix a considerable price upon it at a distance from the place where it is found, and the Venetians have many different names for the varieties of it. If kept longer than a year, it is apt to lose its proper taste and to be spoiled.*

In Dauphiny this manna has been very generally employed by the apothecaries as a laxative, but it is said to possess not more than half the strength of the product of the Calabrian ash. The mode in which it is formed, however, deserves to be more fully inquired into, and it would be satisfactory to ascertain whether there be any difference between this saccharine matter and the *Mel Cedrinum*, *roscidum*, and *aerium*, of the ancients. Galen (in his third book on aliments) describes a mode of collecting the "*Ros Montis Libani*," very similar to that given by Bellonius respecting the manna of the Larch.

BOLETUS LARYCINUS.

Agaricum. *Bellon. Aëtius.* tab. 20, 21. *Dale*, &c. *Jacquin Miscel. Austr.* 1. p. 164.
"*Boletus abies Laricis dicta.*" *Linn. Matt. Med.* 497.
Purging Agaric, (of the shops).

On the trunk of the Larch is sometimes found a remarkable species of *Boletus*, well known to botanists, and which is well described by Jacquin and Pallas.† It does not occur very frequently in the more southern parts of Europe, if we may credit Bellonius, but it is common in some parts of the Russian empire, and exported largely from Archangel. The form is generally oblong, variously lobed, and the lower part is always somewhat truncated, porous, and of a sort of mud colour, whilst the remaining surface has an ashen hue. Its *parenchyma* is soft, sweetish, (at last of a nauseous bitter taste,) and saponaceous, whence it is used among the women in some parts of Siberia for washing their skins, and even their linen.

Bellonius‡ speaks of this fungus yielding a fine purple dye, which has been found out, it appears, by the Tungoos, these people employing a decoction of it with the roots of *Galium* for staining the hair of the rein deer, to ornament their persons.

As a medicine, the *Boletus Larycinus* is now very rarely employed in

* Vide locum supra citatum. † *Fl. Ross.* tom. 1. p. 3.
‡ "*De Arb. Conif.*" p. 26.

England, but it retains a place among the domestic remedies of the Russians, as an emetic in intermitting fevers, and for some female complaints. The Baschkirs sprinkle the powder on foul ulcers of cattle, as a detergent and antiverminous remedy.*

If it be intended to apply the *Boletus Larignus* to medicinal purposes, some caution seems to be necessary, in regard to the time of gathering it. Bellonius† recommends the autumn, that being the season at which, in common with fruits, he supposes this vegetable production to be just in a state of maturity. Should it have exceeded two years' growth, its qualities, he says, will have undergone a change of a deleterious nature; and if it should not have completed one year, the exhibition of it may be followed by effects equally pernicious.

* Pallas. (*loco supra cit.*) † P. 26.

COPY OF A LETTER

FROM

MR. THOMAS DAVIS, OF HOMMINGSHAM, WILTS,

RELATIVE TO THE

TIMBER YIELDED BY VARIOUS SPECIES OF PINES.

DEAR SIR, *Hommingsham, Sept.* 9, 1797.

I AM convinced, from repeated obervations, that the Scotch Fir produces the deal called in London "*Yellow Deal,*" and in the country "*Red Deal,*" and being generally imported from Christiana, sometimes called "*Christiana Deal.*" They frequently come hither in planks, but oftener in boards, *called* twelve inches wide, though seldom above ten inches and a half, cut through and through, or, as the sawyers call it, cut "*fletch.*" Of course the trees are not above twelve inches diameter, and yet I have counted their rings and found their growth to be from sixty to an hundred years. They must, therefore grow thick together, and upon poor or rocky land, and this is also evident by the smallness of the knots, proceeding from the want of room to push out strong boughs.

The Scotch Fir raised in England is equal to the foreign in weight and durability, but is seldom so fine in the grain, and has a greater quantity of sap, owing to its rapid growth, occasioned either by the superior strength of the land, or greater distance from one another, or both. But the quality is sufficiently similar to ascertain that they are the same species.

A foot square of Scotch Fir, English grown, and moderately dry, will weigh fifty-one; a foot of oak not much more than sixty-one.

A tree of an hundred years old, (I look upon the ultimatum of its growth in England as not more than an hundred and fifty,) may measure four load, or two hundred feet, and is fairly worth fifteen pounds.

Land planted with Scotch Firs eight feet and a quarter apart, viz. six hundred and forty to an acre, will pay ten per cent. *compound interest,* supposing very poor land at three shillings per acre, worth about four pounds in fee, and the planting to cost six pounds more, in all ten pounds per acre. In twenty-eight years ten pounds, at compound interest, will be forty pounds, and in that period the trees, at only two and sixpence each, will be worth eighty pounds.

Spruce Firs, from which the deal we usually call *white* deal in England, is produced, are perhaps the next valuable to Scotch Fir; and, what is remarkable, those grown in England are superior to any imported. That kind of tree not being hurt by knots, is the better for rapid growth, and the deal the handsomer. But it does not grow well in exposed situations. It there loses all its side branches, and not growing from leaders as a Scotch Fir does, gets mossy, lingers, and dies: and if put close together, it never rises to any size. Perhaps it may be two or three load in one hundred years, worth seven or eight pounds, but an hundred years seem to be the full *ultimatum* of its growth. It is in fact fit for nothing but a garden, where it is a *pretty thing* for twenty or thirty years, when it grows naked, and should be removed and replaced by others.

The Silver Fir, the most beautiful in external appearance of all the genus, *either young or old*, grows much faster than either the Scotch or Spruce. At one hundred years old, it is frequently above an hundred feet high, twelve or thirteen feet round, and contains at least six loads of timber, worth about fifteen pounds. The timber is more open, or (as the sawyers call it) "roacher in its grain," than the spruce, occasioned partly by the superior luxuriance of its growth, and therefore should be used in large scantlings, where its strength and toughness render it a valuable wood, particularly for beams; only great care must be taken that the ends are dry and accessible to air.

The Weymouth Pine is a *white pine*, but still lighter and *roacher* in the grain than the preceding sorts. Its principal use in its own country (America) is for masts of ships, for which its toughness makes it proper. It will, if placed in strong land, well sheltered, get to four or five load in an hundred years, worth eight or ten pounds.

Larch is a delicate coloured wood, not unlike the Cedar used for black lead pencils, either in colour or smell. It has but little sap, and is convertible to flooring board at an early age, but its knots are then rather unsightly. We have few in this kingdom of a large size, and I have observed they decay and become mossy about forty years old. They grow best in sheltered situations. However, it is a valuable and pretty looking wood, either standing or converted.

It is a mistake to suppose that fir trees should be cut in summer, because, (as they say) the sap, which is the turpentine, is afloat; they should always be cut when the sap is stagnant, viz. in winter. Fir cut in the summer, will become full of mushrooms in a twelvemonth afterwards. I have tried this frequently, and paid dearly for my experience.

PLACES OF GROWTH.

1. Scotch Fir. Mountainous rocky situations, shelter not necessary.
2. Spruce. Gardens and lawns, where it can have room to spread its

lower branches horizontally, and is not wanted to stand above forty years.

3. Silver Fir. Strong lands, fit for oak; rather sheltered; but shelter not indispensable.
4. Larch. Sheltered situations on the sides of hill; sandy, if possible, though poor. It does not like cold wet land.

I omit the Balm of Gilead Fir, as we have had none grown to an age sufficient for determining its rise as timber. It seems to be very like the Silver Fir in quality.

I hope, Sir, you will find something in these remarks worthy your notice, as they are the result of the experience of above thirty years, *from the seed to the great tree.*

I am, Sir,

Your very humble servant,

THOMAS DAVIS.

EXTRACT

FROM

THE REV. WILLIAM COXE'S TRAVELS IN POLAND, RUSSIA, SWEDEN, AND DENMARK,

ON THE SUBJECT OF

CHRISTIANA DEAL.

(Vol. V. p. 28. 5th Edit.)

"THE planks and deals are of superior estimation to those sent from America, Russia, and from the different parts of the Baltic, because the trees grow on the rocks, and are therefore firmer, more compact, and less liable to rot than the others, which chiefly shoot from a sandy or loamy soil. The planks are either red or white fir, or pine. The red wood is produced from the Scotch Fir, and the white wood, which is in such high estimation, from the Spruce Fir. This wood is the most demanded, because no country produces it in such quantities as this part of Norway. Each tree yields three pieces of timber, eleven or twelve feet in length, and is usually sawed into three planks; a tree generally requires seventy or eighty years' growth before it arrives at the greatest perfection.

"The environs of Christiana not yielding sufficient planks for exportation, the greater part of the timber is hewn in the inland country, and floated down the rivers and cataracts. Saw-mills are used for the purpose of cutting the planks, but must be privileged, and can only cut a certain quantity. The proprietors are bound to declare on oath, that they have not exceeded that quantity; and if they do, the privilege is taken away, and the saw-mill destroyed. There are one hundred and thirty-six privileged saw-mills at Christiana, of which one hundred belong to the family of Anker. The quantity of planks permitted to be cut amounts to twenty millions standard deals, twelve feet long, and one inch and a quarter thick."

In Scotland they distinguish the wood cut in the native forests from that obtained in plantations, by calling the former *Highland Fir*, and the latter *Park Fir*. The Highland Fir is most esteemed, on account of its greater durability, being frequently found undecayed in ancient buildings, when the other sort is entirely wasted. This striking difference in the same species is probably to be attributed to the mountainous and rocky situations in which the native timber is found, and where the trees being of slower growth, the wood is consequently of a harder texture; the latter may be readily distinguished from that of the Park Fir by its much deeper yellow colour.

COPY OF A LETTER

FROM

THOMAS MARSHAM, ESQ. TR. LS. TO THE AUTHOR,

ON THE SUBJECT OF

INSECTS DESTRUCTIVE TO PINES.

DEAR SIR, *Baker Street, June* 6, 1803.

Agreeably to your desire, I have perused with care and attention the several letters from your friends in Wiltshire, respecting the insect which attacks the various species of Pine trees in that county. It is evidently the Dermestes piniperda of Linnæus (Ips piniperda of Coleoptera Britannica and De Geer), and although apparently so common and destructive, is yet but little known in its larva or grub state, for all the observations seem to relate to the perfect insect, whereas most animals of this kind are in general found to be far more mischievous in their primary or larva state. Linnæus observes that it perforates the inferior branches of the Pine; De Geer remarks, that he has found it in the wood of weak trees, and also within the young green branches, which it hollows interiorly by eating the substance, and this causes the branches to dry and perish; but neither of those authors mentions the particular species of Pine to which it gives a preference. Mr. Wickham, in his letter to you, states that he found it on Pinus sylvestris, Pinea, and Strobus, but that its greatest ravage was on Pinus sylvestris; that he had not perceived it on Pinus Cembra, Abies, or on either species of Larix. Mr. Davis observes, "that it bores a hole through the shoots of the last spring, about eight inches from the summit, and then works its way up the pith, whereby the branch withers and breaks off; and as it attacks not only the main leader, but also the side leaders, of course the tree will lose all its leaves the second year, and must inevitably die." The devastation mentioned by the Duke of Somerset and Lord Malmesbury, which had taken place in the Pine forests in Germany, I am of opinion cannot be attributed to the Ips piniperda, but to the larva of the Phalæna Bombyx Monacha of Linnæus, which consumes the leaves of the Pine, and which you as well as myself have been lately informed has destroyed whole forests thirty miles in extent. D. Johann. Heinrich Jordens, in a work published in German in the year

1798, says, that the larva of this moth has discovered its mischievous tendency these two years, by entirely destroying the forests of Schlier and Ebendorf, and has now begun to spread itself on the confines of Voightland towards Bayreuth, where it attacked in a circumference of eight or ten German miles (i. e. forty-eight to sixty English) several larger and smaller forests. In 1784, he observes, that in the Selber forest it eat up the Fir as well as the Pine trees; but this circumstance had not been noticed in general, and he thinks that nothing but extreme hunger could force them to attack the needles of the Fir tree. The larva of the Tenthredo Pini is another very pernicious little animal: a few of them were sent some years since from Scotland, which I had to examine: they had destroyed an immense and valuable plantation of Pines. This latter insect is very accurately described by that celebrated Swedish naturalist the Baron De Geer. The Curculio Pini and Curculio Abietis are said to be very prejudicial to trees of the Genus Pinus; but as the larvæ of these, I presume, feed on the substance of the wood, their larvæ are but little known. Six other insects are also enumerated by the German writers as destructive to the Pine, viz. Dermestes Typographus, Polygraphus, Micographus, and Calcographus, Dermestes Scolytus, and Cerambyx Inquisitor; to which a much longer list might be added, both of those that feed on the leaves and those that penetrate into the trunk itself.

We have most, if not the whole, of these insects in our own country, but happily we hear but of little mischief occasioned by them, and they are but rarely found. Of Dermestes Typographus I have never yet found a single specimen; and of Phalæna monacha but one, during the number of years that I have made this branch of science the amusement of my leisure hours. The Dermestes Scolytus seems with us to confine its ravages to the Elm, of which mischief I have been lately an eyewitness.

I have thus endeavoured to comply with your wishes in stating a few facts, which I fear will afford you but little information, nor do I by any means think them deserving publication, as they lead to nothing; unless that, as a spirit of inquiry seems to be taking place, they may act as a stimulus to engage gentlemen who have leisure, and possess large plantations of Pines, to examine into and investigate the nature, habits, and œconomy of these small destructive beings. And in that case, I would recommend to their particular observation, to attend to and watch their progress, to search for and discover their natural enemies, and endeavour to employ them one against the other, for each of them is food for some other animal, which if encouraged will do more towards extirpating them, than all the powers which human skill could effect: for I am fully convinced that we often destroy the friend and spare the foe, for want of proper knowledge and discrimination; and this frequently in the case of birds, who are very great destroyers of insects. I would advise persons

whose interest is concerned in saving their plantations and crops, whenever they shoot a bird, carefully to examine its craw, and note what it contains, by which means they would soon gain valuable information, and know when to destroy and when to encourage. The great desideratum of the Entomologist is to know his insect in all its stages, its habits, and œconomy; and for this they must require the assistance of persons resident in the country, who have these things constantly before their eyes, but who pass by them without the slightest notice, or even consider them as deserving attention, though perhaps they are suffering most materially.

I can only add, that if this hasty production gives you any pleasure or satisfaction, the end is answered to

Dear Sir, yours truly,

THOMAS MARSHAM.

A. B. Lambert, Esq.

SYNOPTICAL TABLE OF THE SPECIES,

SYSTEMATICALLY ARRANGED.

ABIETINEÆ.

Flores fœminei, inversi, gemini, squamæ adnati. *Strobilus* squamis compluribus imbricatis. *Gemmatio squamata.*

PINUS.

Amenta mascula cylindracea, multiflora. *Antheræ 2*, coalitæ, lineares, squamâ arctè connatæ, cristâ membranaceâ terminatæ. *Strobilus* imbricatus. *Semina 2*, apice obliquè alata.

Strobilus pyramidatus: squamis crassissimis, ligneis, subtùs carinatis, adpressè imbricatis, apice dilatato angulato, sæpè tuberculato. *Seminis testâ* osseâ. *Folia acerosa, sæpiùs gemina, vaginâ persistenti.* Pinus.

		Page.	*Tab.*
1.	Pinus sylvestris	1	1
2.	Pumilio	6	2
3.	Banksiana	9	3
4.	Laricio	11	4
5.	Pallasiana	13	5
6.	maritima	16	6
7.	halepensis	18	7
8.	Massoniana	20	8
9.	Pinaster	21	9
10.	Pinea	23	10, 11
11.	inops	25	12
12.	resinosa	27	13
13.	variabilis	29	14
14.	Tæda	30	15
15.	rigida	32	16
16.	pungens	34	17
17.	serotina	35	18
18.	patula	36	19
19.	Teocote	37	20
20.	leiophylla	38	21
21.	Montezumæ	39	22
22.	occidentalis	40	23
23.	palustris	41	24, 25
24.	longifolia	43	26, 27
25.	Canariensis	45	28
26.	Sinensis	47	29

SYNOPTICAL TABLE.

	No.	Species	Page.	Tab.
Strobilus lævis: *squamis* planis, dorso convexis, ligneis, apiculatis, imbricatis. *Semina* osseâ. *Folia quina, tenuissima, triquetra, vaginâ laxâ deciduâ.* Strobus.	27.	Pinus Cembra	48	30, 31
	28.	Strobus	51	32
	29.	excelsa	55	33
	30.	Lambertiana	57	34
Strobilus cylindraceus: *squamis* coriaceis, margine membranaceo-scariosis, concavis, laxè imbricatis. *Semina* coriacea. *Folia solitaria, tetragona, subulata, undique versa.* Abies.	31.	Abies	59	35
	32.	alba	61	36
	33.	nigra	64	37
	34.	rubra	66	38
	35.	orientalis	68	39
Strobilus cylindraceus: *squamis* planis, fungosis, imbricatis. *Antherarum* cristâ apice corniculatâ. *Semina* coriacea. *Folia solitaria, plana, secunda.* Peuce.	36.	Picea	70	40
	37.	balsamea	72	41
	38.	Fraseri	74	42
	39.	religiosa	76	43
	40.	Webbiana	77	44
	41.	Canadensis	79	45
	42.	dumosa	80	46
	43.	taxifolia	82	47
Strobilus ovalis: *squamis* membranaceis, subcoriaceis, laxè imbricatis. *Semina* testâ coriaceâ. *Folia fasciculata, decidua, angustè linearia, mollia.* Larix.	44.	Larix	83	48
	45.	pendula	86	49
	46.	microcarpa	88	50
Strobilus turbinato-ovatus, summo depressus: *squamis* lamelliformibus, transversè oblongis, coriaceis, adpressis. *Semina* testâ coriaceâ. *Folia fasciculata, sempervirentia, subulata, rigida* Cedrus.	47.	Cedrus	89	51
	48.	Deodara	93	52
CUNNINGHAMIA. *Flores* monoici. *Strobilus* ovatus: *squamis* ovatis, acutis, coriaceis, imbricatis. *Antheræ* 3, pendulæ, distinctæ, basibus solutis. *Semina* 3, compressa, alâ cincta. *Embryo* dicotyledoneus. *Folia sparsa, lanceolata, acuminata, plana.*	49.	Cunninghamia Sinensis	96	53
DAMMARA. *Flores* monoici. *Amenta mascula* oblongo-cylindracea: *squamis* induratis, creberrimè imbricatis, limbo dilatato. *Antheræ* numerosæ (5-24) pendulæ, distinctæ, basibus solutis. *Strobilus* turbinatus: *squamis* orbiculatis, ligneis. *Semina* apice alata. *Folia opposita, patula, plana, coriacea.*	50.	Dammara orientalis	97	54
	51.	australis	102	55

SYNOPTICAL TABLE.

ARAUCARIA.

Flores dioici. *Amenta mascula* oblonga, squarrosa. *Antheræ* numerosæ (12-20) distinctæ, basibus solutis. *Strobilus* subrotundus: *squamis* coriaceis, intùs cavis semen unicum continentibus, apice lanceolato, acuto, patulo. *Folia imbricata, coriacea, rigida, mucronata.*

		Page.	Tab.
52.	Araucaria imbricata . .	106	56, 57
53.	Brasiliana . .	111	58, 59, 60
54.	excelsa . . .	112	61, 62

CUPRESSINEÆ.

Flores fœminei erecti, liberi, plures, capitati. *Galbulus* squamis sæpè peltatis vel confluentibus drupam simulans. *Gemmatio nuda.*

TAXODIUM.

Amenta mascula brevia, pauciflora, laxa. *Antheræ* 3-5, globosæ, bivalves, squamarum basi adnatæ. *Galbuli squamis* peltatis. *Semina* 2, trigona, testâ ligneâ. *Embryo* polycotyledoneus. *Folia linearia, pectinato-disticha.*

		Page.	Tab.
55.	Taxodium distichum . .	116	63
56.	sempervirens .	120	64

CUPRESSUS.

Amenta mascula brevia, multiflora, imbricata. *Antheræ* 2-4, globosæ, bivalves, basi squamarum adnatæ. *Galbuli squamis* peltatis. *Semina* numerosa, angulata. *Embryo* dicotyledoneus. *Folia squamiformia, imbricata.*

		Page.	Tab.
57.	Cupressus Lusitanica . .	121	65
58.	pendula . .	124	66
59.	torulosa . .	126	
60.	Nootkatensis .	126	

THUJA.

Amenta mascula brevia, multiflora, imbricata. *Antheræ* 3, globosæ, bivalves, basi squamarum adnatæ. *Strobili squamis* oblongis, apice extùs tuberculo auctis, rarò subpeltatis. *Semina* 2, compressa, sæpè margine alata. *Embryo* dicotyledoneus. *Folia squamiformia, imbricata.*

		Page.	Tab.
61.	Thuja plicata	127	
62.	Chilensis . . .	128	
63.	pensilis . . .	129	
64.	pendula . . .	130	67
65.	dolobrata . . .	131	68

TAXINEÆ.

Flores fœminei solitarii. *Fructus* drupaceus, monospermus, basi cupulâ carnosâ cinctus. *Gemmatio squamata.*

JUNIPERUS.

Amenta mascula brevia, multiflora, imbricata. *Antheræ* 4, globosæ, bivalves, basi squamarum adnatæ. *Fructus* è squamis confluentibus carnosus, drupaceus. *Semina* abortu 1-3, trigona, ossea. *Folia subulata, pungentia, laxè patula, v. imbricata et mutica.*

		Page.	Tab.
66.	Juniperus squamata . .	133	
67.	uvifera . .	134	

SYNOPTICAL TABLE.

DACRYDIUM.

Amenta mascula brevia, multiflora, imbricata. *Antheræ* 2, rimâ transversali hiantes! basi squamarum adnatæ. *Fructus* drupaceus, monospermus, cupulæ carnosæ ferè immersus. *Embryo* dicotyledoneus. *Folia subulata, imbricata v. linearia, plana, disticha.*

		Page.	Tab.
68.	Dacrydium cupressinum	135	69
69.	taxifolium	137	
70.	distichum	138	

PODOCARPUS.

Amenta mascula cylindracea, multiflora. *Antheræ* geminatìm connatæ. *Fructus* exsertus, monospermus, basi cupulâ tubulosâ carnosâ suffultus. *Semen* osseum. *Folia alterna, dilatata, plana, patula.*

		Page.	Tab.
71.	Podocarpus saligna	139	
72.	oleifolia	140	
73.	glomerata	141	
74.	nereifolia	142	
75.	macrophylla	143	
76.	pungens	144	